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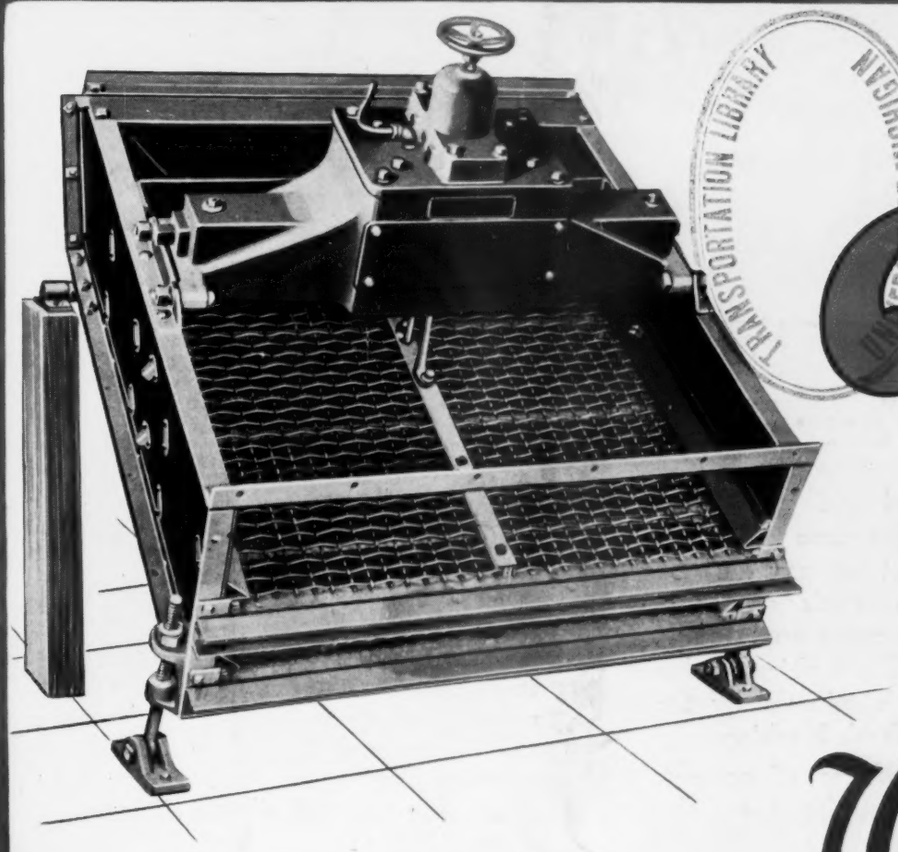
Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Chicago, February 16, 1929 (Issued Every Other Week) Volume XXXII, No. 4



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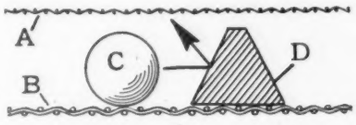

A—Screening mesh.

B—Coarser ball supporting screen.

C—The solid rubber balls flying about, due to the gyrating action of the screen box, strike the inclined surface D and are deflected upward, hitting the under side of the screening mesh.

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Rock Products

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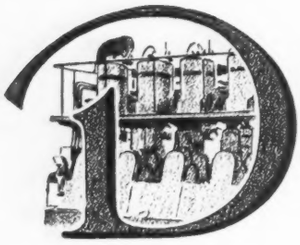
The Diesel dredge "Milly Fry" of the Greenville Sand and Gravel Co., of Greenville, Miss., loading gravel barges on the lower Mississippi river. This dredge is equipped with a 180-hp. motor driving a 15-in. pump



Diesel Engines

Part 1—Installations and Records of

By Orville Adams.

THE widespread adoption of the Diesel engine in the rock products industries indicates that it is the more desirable power machine when compared with the earlier types of gasoline and kerosene engines heretofore used. The Diesel type may be classed as a more reliable, higher developed and more economical type of internal combustion engine.

In the chart, Fig. 1, is illustrated graphically the major proven applications of the oil engine, in the principal branches of the industries and their subdivisions. While the marine-type, hydraulic dredge and other large floating gravel units continue to lead as chief users of oil engines, the application in all of the industry is rapidly increasing, as the need for more economy and greater reliability, together with the simplicity of operation becomes more acute.

It might therefore be of definite interest to look into the type and design, as well as the practical application, of this prime mover in the various branches of the industry. In these articles we shall show what has been the record for economy, practicability, reliability and simplicity of operation, of the Diesel-type engine in the rock products industries.

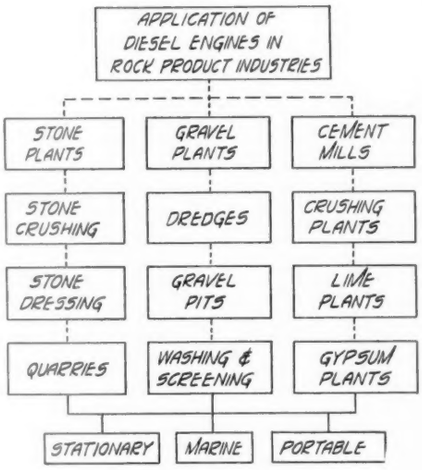


Fig. 1. Chart showing the chief applications of Diesel engines in the rock products industries

Gravel Plants

In the gravel business, we find the use of oil engines in stationary plants and floating units as a widespread practice, particularly on the rivers. The floating type of dredge, both bucket and hydraulic pumping is the most important. These plants fall into two classes: (1) The floating unit as a complete plant. This plant has all the washing, screening and cleaning machinery aboard the dredge boat, the clean classified material being loaded into barges for transportation in one operation. (2) The hydraulic dredge, having the pumping unit only aboard, with the raw material either loaded into barges and towed to the shore station, or delivered to the shore station hydraulically through a pipe line.

A survey was made of both types of plants, and of the use of oil engines found in all steps of the operation. The results speak for both the economy and the reliability, of these units, since in every case the operators were thoroughly convinced of the desirability of the Diesel.

An interesting example of the use of oil engines on the Mississippi river for gravel work is illustrated in Fig. 2, which shows the hydraulic, marine-type pumping unit, of the Tennessee-Arkansas Sand and Gravel Co. This boat is typical, both in design and layout, of oil-engine-driven dredges and has a record in keeping with Diesel experience in this kind of service. It is equipped with a 225-hp. Anderson oil engine, of the crankcase compression, two-cycle, vertical, heavy-duty type, employing mechanical injection and operating on low-grade fuel oil. It has been in operation about five years. The engine is direct-connected to a 15-in. gravel pump of the centrifugal type equipped with manganese liners and special bearings. It is controlled through a clutch and operates at an average speed of 250 r.p.m. Gravel is delivered unscreened into the barges alongside and is towed to the shore station, Fig. 3, where it is washed, screened and delivered to the cars. The tugboat *Woodstock*, shown in Fig. 4, is used for this service. This is equipped with a 180-hp. engine of the same type, direct-connected to a screw propeller. The tug makes good speed upstream with two 200-yd. barges loaded with gravel. A derrick boat is used at the landing with a clamshell for unloading the barges and delivering the sand on to a belt conveyor, by which it is carried to steel cars for transportation to the plant.

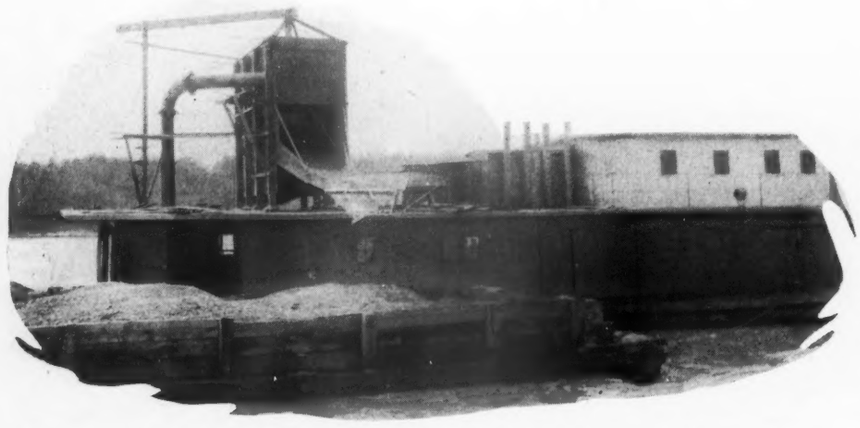


Fig. 2. The hydraulic dredge of the Tennessee-Arkansas Sand and Gravel Co. equipped with 15-in. pump direct-connected to a 225-hp. Diesel engine

This plant is located at Arkansas City, Ark. It produces, in addition to large amounts of railroad ballast, a quantity of materials for the highway departments of the adjacent states, commercial sand and gravel and special concrete mix material used in connection with the manufacture of special concrete products. The plant runs at capacity practically throughout the year.

According to C. C. Hawkins, the general manager, the special advantages of this type of operation are that the land or shore unit can be located in a permanent position at the railhead where constant changes, developments, modifications and improvements to meet the needs and demands of the market can be made more easily and economically. While these changes are necessary to meet

in Rock Products Industries

Diesel Power in Sand and Gravel Operations
Memphis, Tennessee

the increasing standards for road building material, commercial concrete aggregate, and such material, this arrangement enables the floating unit to remain as originally designed and powered, and to be able to move about to different deposits, giving the advantage of more flexibility and wider range of operation. The tug and pump boat may also supply one or more shore stations with materials.

A Record of Four Years' Operation

In this plant, four years of operation have demonstrated the advantages of oil engine power fully. The reduction in labor requirements, and the saving of space aboard the boat are apparent, but by no means constitute the principle advantages. Among the important reasons for preference of the oil engine in gravel plants, according to Mr. Hawkins, the following are outstanding:

(1) Fuel economy. The Diesel is ahead of steam in this.

(2) Elimination of handling coal and ashes. Handling and re-handling fuel and ashes for the dredge constitutes quite a cost. The matter of handling, transporting and supplying fuel oil for the Diesel is quite simple and a small item of operation.

(3) Flexibility of operation. Frequently the dredge must wait for the return of the tug, and stand-by economy is a big item.

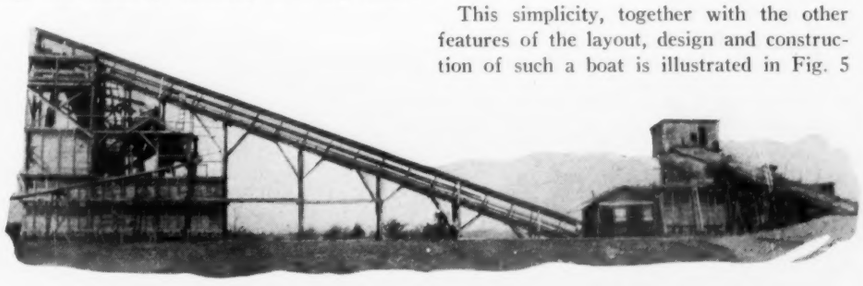


Fig. 3. The shore plant of the Tennessee-Arkansas Sand and Gravel Co.

(4) Durability and small maintenance cost. These are salient advantages noted over a period of years, and appreciated by this operator who has experience with both steam and oil-engine-driven plants.

(5) Greater safety from fire hazard and hence reduced insurance cost. The chances of fire are remote for these oil engine dredges.

(6) No special engineer is required. The operation does not require a specially trained man, nor does the Government require a licensed engineer on this class of rivercraft.

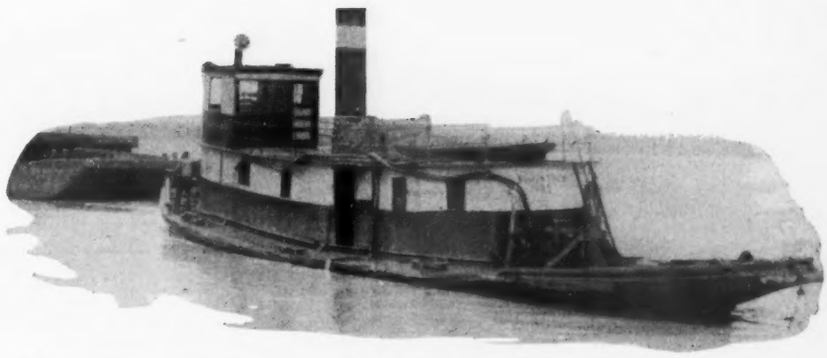


Fig. 4. Tug powered with a 180-hp. Diesel engine used by the Tennessee-Arkansas company to deliver sand from the dredge to the barge

Simplicity of Plant Layout

Reduction in size and the simplicity of construction of this type of dredge boat is an important item in oil engine economy. The saving by this reduction practically offsets the cost of the Diesel engine itself, leaving the first cost of the plant practically free of power plant investment. Floor space aboard these boats is, in most cases, a third less when the Diesel is used, a factor that has had a decided influence on design of such boats.

This simplicity, together with the other features of the layout, design and construction of such a boat is illustrated in Fig. 5 and Fig. 6. This boat is equipped with a 225-hp. engine direct-connected to a 12-in. gravel pump. While the boat is sufficiently large to give ample clearance around the machinery, it can be noted from the drawing that the auxiliaries require little or no consideration as to space. The air starting, fuel supply and other equipment may be located in various places above or below deck and the space is a small matter. The multiple-cylinder, vertical engine located in the center of the boat, if properly installed, does not produce objectionable vibrations. Generators are frequently used for actuating magnetic clutches, providing power for small motors for cutter heads, hoists, and other auxiliaries. In the design shown in the drawing the generator is direct-connected to the end of the engine opposite the pump and clutch mechanism, but it may be driven on the same shaft and at the same end of the engine as the main clutch.

The Floating Unit as a Complete Plant

The marine-type, floating plant as a complete unit with all the screening, washing and classifying machinery aboard the boat is illustrated in Fig. 7. This is the dredge boat *Milly Fry* of the Greenville Sand and Gravel Co. of Greenville, Miss., It is equipped with a 180-hp. Fairbanks-Morse, Diesel engine direct-connected to a 15-in. gravel pump. The operation is one of the most successful and economical on the Mississippi River.

A popular type of dredge found in Southern waters is shown in Fig. 8, this illustration showing the dredge *Atlanta,* owned and operated by the Thompson and Moseley Co., of Tampa, Fla. This boat is at present operating near Pascagoula, Miss. It is equipped with a 225-hp. engine direct-connected to a 15-in. pump. Several similar types are operating in this vicinity, as the oil engine dredge is popular and numerous in this region.

Land Plants

Design and construction of oil engine driven land plants and shore stations are shown in Fig. 9 and Fig. 10. In this typical plant washing and screening machinery is

driven from the main power plant through rope and belt drives taken from the main shaft, and this latter is belt-driven directly from the engine. This plant is equipped with Stephens-Adamson machinery throughout. It may be noted, both from the drawings and from the pictures, that the location of the engine at these plants can be made very practical, as it requires so little space that it can frequently be located just under the conveyor or at the end of the plant structure. Fig. 11 and Fig. 12 show the plant and engine of the Wynne Sand and Gravel Co., Wynne, Ark., and the drawings are of the very similar plant of the Meriwether Sand and Gravel Co., Lewisville, Ark.

Cost Data and Operation

Our survey of the application of oil engines in the sand marine-type and gravel plants reveals considerable interesting and enlightening data relative to the cost per day and per ton of material produced. C. P. Stanley, secretary of the Tennessee-Arkansas Sand and Gravel Co. mentioned, furnished the writer with the following costs bearing upon the experience of four years operation of the oil engines at that plant.

The pump boat is operated with a crew of only six men and has an approximate average labor cost of $30.00 a day, while the tugboat, *Woodstock* with a crew of four men, has an average labor burden of $22.00 per day. On the daily cost sheet for the operation of the entire floating unit, including both dredge and tug, the cost of the supplies, consisting of fuel and lubricating oil for the engines, is only $20.00 per day, and this includes minor repairs, oil and grease for the pumps, auxiliaries and waste. The cost never exceeds this daily allowance with Diesel fuel oil at $0.06 per gal.

For some years there has been a daily average output of about four barge-loads of 200 cu. yd. each, or 800 cu. yd. With a fuel and oil cost of operation segregated as $12.00 per day for the dredge and $8.00 a day for the tug boat, the power cost per yard for pumping is 1½ c. and the power cost for transportation up stream seven miles with the tugboat is 1c. per yd., or a total power cost for delivery at the shore station of 2½c. per yd. of material exclusive of depreciation and overhead.

To show how the oil engine contributes to the profits in this installation, the writer obtained from the secretary figures as to production and delivery for a three months period, as follows:

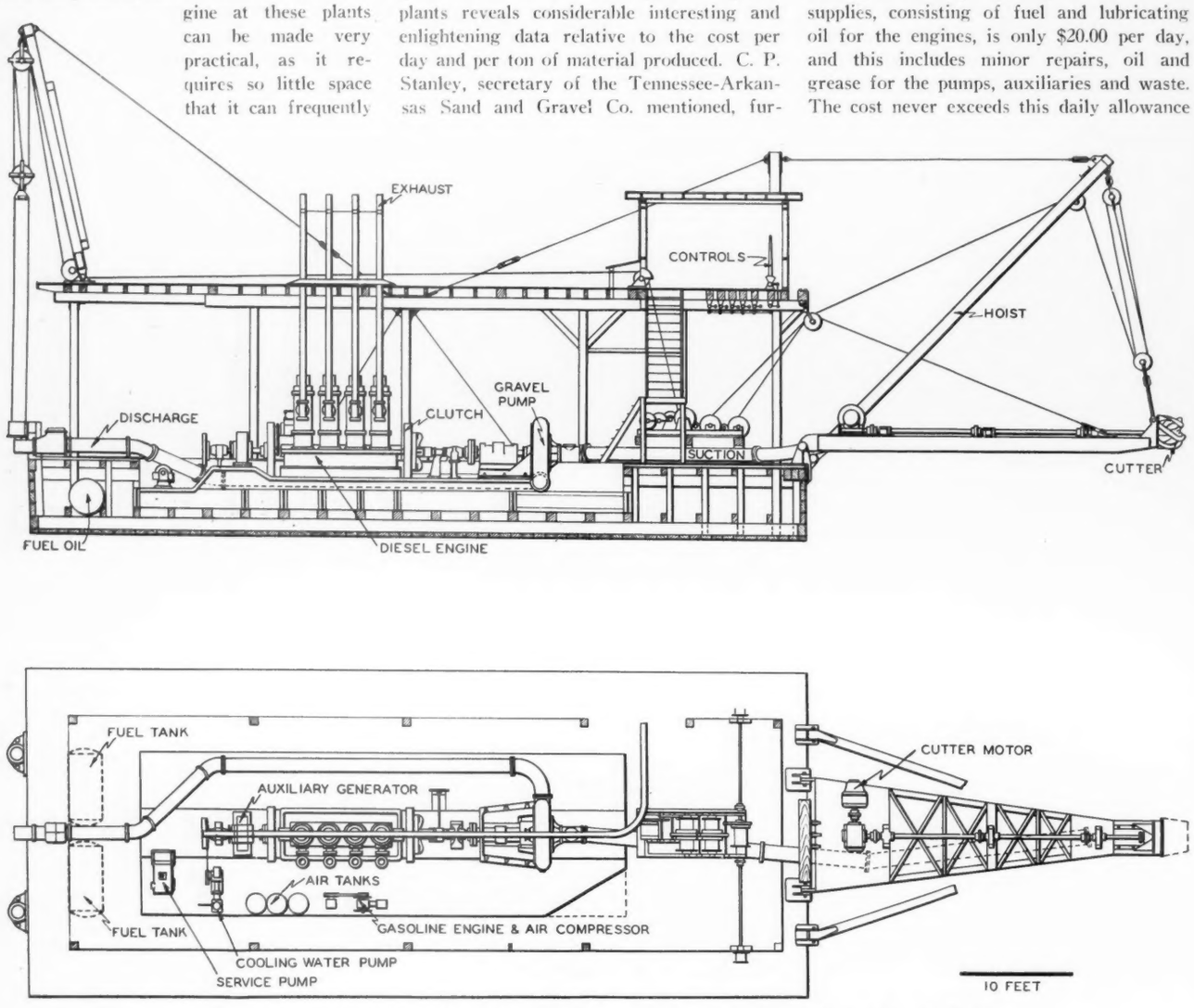


Fig. 5. Cross section and deck layout of a typical, oil-engine-driven river dredge

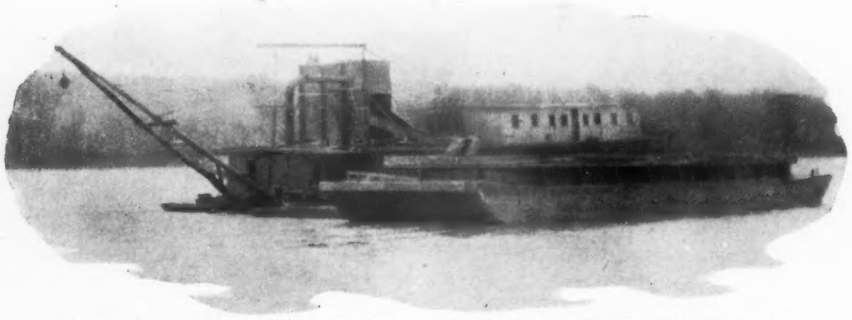


Fig. 6. Typical Mississippi dredge equipped with a 225-hp. Diesel engine

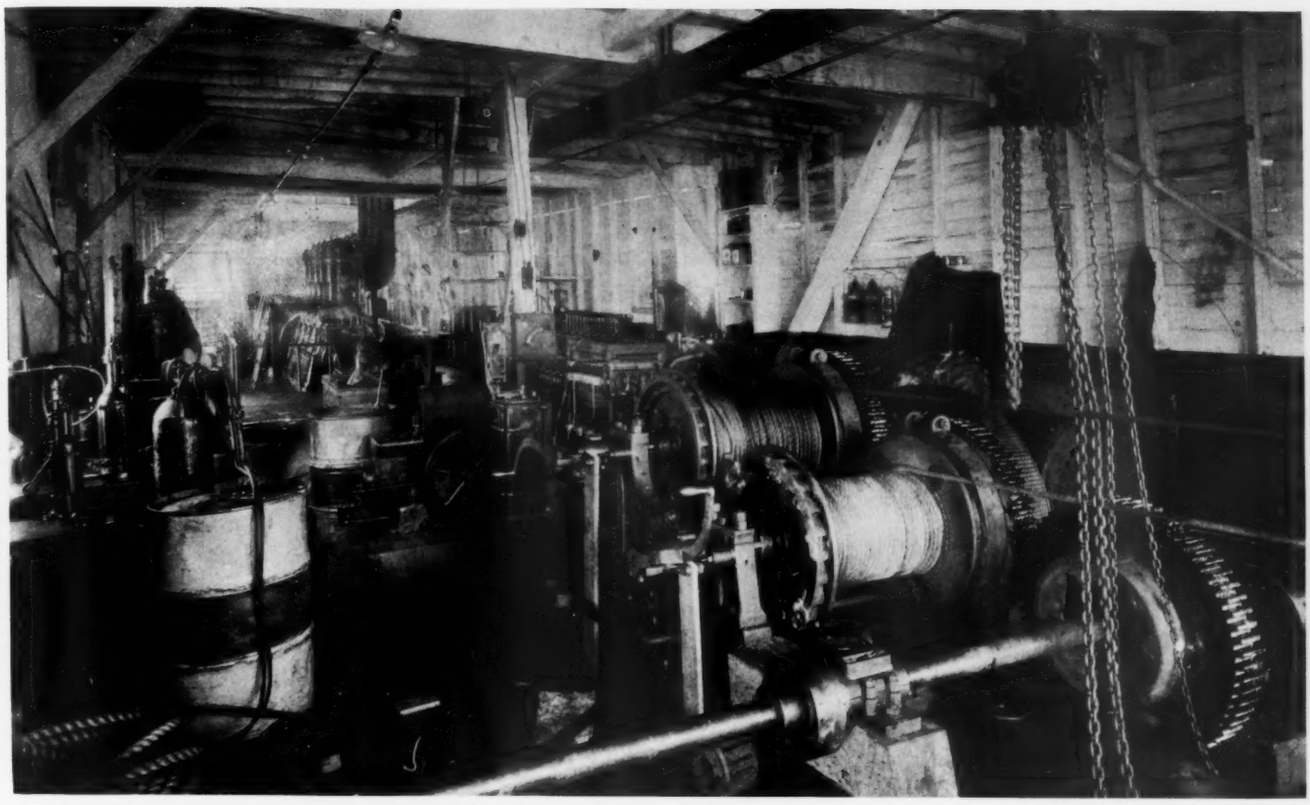


Fig. 7. Interior of the "Milly Fry," operated by the Greenville Sand and Gravel Co., Greenville, Miss.

March,	1928	105 barges	21,981 cu. yd.
April,	1928	110 barges	23,077 cu. yd.
May,	1928	97 barges	18,574 cu. yd.

The fuel and lubricating oil consummed for these three months in pumping and transporting more than 65,000 cu. yd. was about $1300. The average monthly shipments were about 675 cars. The cost for power was therefore slightly less than 2c. per yd. for material delivered at the land plant. With the above figures on daily and monthly production, we can gain a further idea of oil engine savings by the following yearly statement of business and operating cost and net profits.

Production and Sales 1927

Capitalization		$100,000
Present book value of plant and equipment		80,000
Production: Annual output (yd.)		180,000
Value of sales: Collected		$161,795
Total cost of goods sold:		
Operating expenses	$67,826	
Administrative expenses	43,000	110,826
Annual profit (less all expenses)		$ 50,000

It has been definitely established by the owner and operator of this plant, and has been verified by the writer as well, that the savings due to the oil engine compared with a steam operation is not less than $100 a day. If this were a steam outfit operating under the same conditions, the cost for fuel in such a plant would reduce the net profit better than $25,000 a year, or practically 50%. This places the choice of oil engines in a very favorable light. In an operation of this size the matter of $25,000 is a consideration bearing a very important relation to whether the operation is really profitable or not. These cost figures will apply, relatively, to the several operations studied.

Comparison With Steam Driven

The Greenville Sand and Gravel Co. dredge, *Milly Fry*, which was mentioned above and which is now operating below Greenville, Miss., offers a direct comparison between steam and Diesel power that shows the unusual savings in this size of plant with the use of oil engines. The figures are for the past year and can be considered average.

The chief engineer, John Peterson, gave me the records for the month of March, 1928, as a typical month. Two shifts of five men each, or a total crew of ten men for 24 hours operation are employed on this boat. Gravel is pumped from the bottom of the river, and at this particular location a great quantity of material must be pumped as there is practically three times as much sand as gravel and the sand must be wasted overboard, only the gravel being kept.

This dredge was formerly operated with steam and required a double crew of 17 men, including firemen. The fuel cost when using steam was $5.85 an hour. The cost of operation with the Diesel engine, for fuel and lubricating oil was found to average $1.32 an hour, or a saving of about $4.50 an hour on fuel alone, or a total fuel saving of $108.00 per day of 24 hours. In this month the dredge pumped 39,010 cu. yd., loading 659 cars of gravel. The total fuel consumption was 5212 gal. of 36-38 distillate oil, costing about 6c per gal. There was used 200 gal. of lubricating oil which includes oil used on the pump and on the auxiliaries from which the oil could not be reclaimed. When it is remembered that the entire operation is performed aboard the dredge and that this cost is for clean washed and classified gravel, the figures on savings is quite significant in comparison with the previous experience with the steam-driven operation.

The same record of economy and wide range application can be found on bucket or dipper dredges, clamshell dredges and ladder dredges as well as hydraulic dredges. When the hydraulic dredge digs the material and transports it to the point where it is screened and loaded, through pipe lines, more power is required per cu. yd. capacity than in any other type of dredge. The total of this power requirement, however, is less than for other types of dredges where the power for transportation by means other than hydraulic must be added to the power required for digging. It has been established that the plant charge per cubic yard of material handled is much less with the hydraulic dredge, for figures show that for every dollar of first cost on these plants there is a larger output and a lower cost. For these reasons this type of dredge is favored wherever gravel can be recovered from the bed of a stream or water is available for pit operation in the same manner.

Fig. 8. The "Atlanta" is an oil-engine-driven dredge operated at Tampa, Fla.

A complete, compact unit with all machinery aboard the dredge is then feasible, making possible the transportation of the material through the pipe lines to the point of loading into the cars or to storage, and everything can be driven from a single oil engine unit.

the other being where there is no head and the pump is simply circulating the water. Should the discharge line be closed up, the pressure will rise to a certain definite and predetermined value, and will remain there, while the water is churned around in the

while pumping, at a point near the pump, reducing the total head, the power requirements will increase rapidly. This point of low head power requirement should be used instead of the normal power requirement or the high head point in fixing the power requirement for the oil engine. This precaution is necessary in order to avoid the chance of overloading.

The total dynamic head against which a pump operates comprises the sum of the suction head, the velocity head, the static head and the friction head. The suction or entrance head is taken practically at 15 ft., and is measured by a vacuum gage near the pump on the suction line. The depth of digging has little effect on this gage, but it will show considerable increase in than for pumping reduced amounts to a high reading when the pump is speeded up or

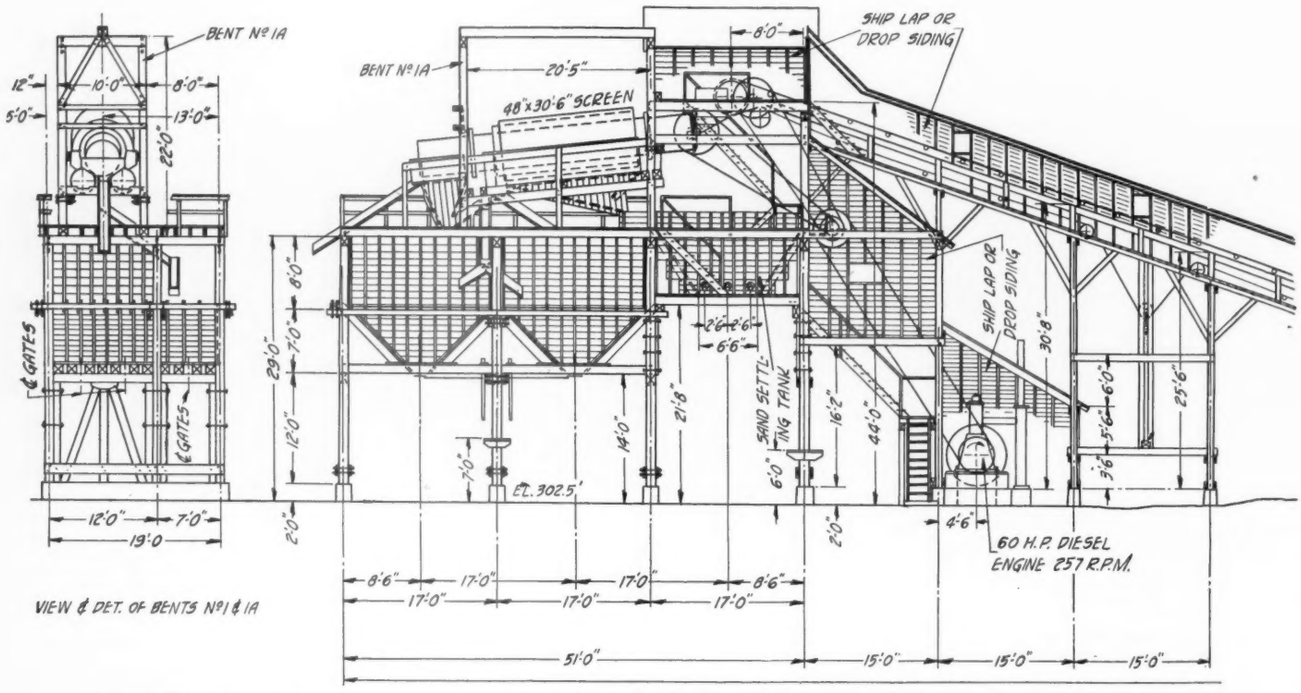


Fig. 9. Elevation and section of the screening plant of the Meriwether Sand and Gravel Co. at Lewisville, Ark.

Where the material is handled in this manner by a complete plant and delivered hydraulically to the storage as finished material, the cost with oil engines may be even less than 15c. per cu. yd. under a variety of conditions. This cost will vary little with the length of the pipe or with the amount of solids pumped. It is, of course, a total operating figure, including all items under that head, but not depreciation, overhead, etc.

Efficiency and Power Requirements

The principles of the gravel pump are practically the same as for any centrifugal pump, but the weight of the water, plus the weight of the solids must be considered. It is well known that, if the speed is fixed, a centrifugal pump has two fixed points of zero efficiency, one being where the head is so great that the pump will not deliver, and

pump and becomes heated. This is the upper zero efficiency point, and at this point the power consumed is less than when liquid is being delivered.

there is an obstruction in the suction line. Practically this gage indicates the height of the instrument above the water level and the resistance of the water to a normal

TABLE I—GENERAL DATA ON DREDGING PUMPS

Size of pump	Nominal g.p.m.	Solids cu. yd./hr. (10% solids)	Friction hd. p. 100 ft. pipe	Equiv. length straight pipe per 90 deg. ell	Hp. per foot total head*—At pump pulley	Hp. per foot total head*—Including average losses†	Hp. per foot total head*—Including excess† solids
*6 in.	900	30	9.2	18	0.625	0.722	0.86
8 in.	1700	60	7.55	24	1.15	1.42	1.575
10 in.	2600	90	6.03	30	1.85	2.38	2.65
12 in.	3800	125	5.13	40	2.33	2.87	3.19
15 in.	6000	210	4.03	55	3.75	4.66	5.18

*Average conditions—allow for variations here.
†Power transmission—water pump—air compressor, etc.
Total power must never exceed rated horsepower of engine.

When pumping large amounts of water against a very low head, the maximum power is required, it being much greater head. If the operation is at a low head, say 2 to 5 ft., or the discharge line breaks

velocity of about 10 ft. per second through the suction pipe. This resistance is the velocity head and can usually be reckoned at from 1½ to 2 ft. for all practical purposes. The reading on the gage is con-

verted to feet of head by multiplying by 1.13 which gives a result that is near enough correct for all practical purposes.

The static head is the vertical distance between highest point in the discharge line and the point where the vacuum gage is attached to the suction line. If the pipe is kept running full all the way to the discharge point, the vertical distance to the end or discharge point can be used for this head after operation has begun instead of the distance to the highest point, because of the syphoning action.

The friction head varies with the size of pipe and velocity of the water as well as with the kind of pipe used. It is also affected by bends and elbows in the pipe. The addition of solids to clear water increases the friction head to a considerable extent according to the class of solids being pumped. This increase ranges all the way from 10% for soft fine sand to 50% for rough solids, and has an average value of 25% above the figure for clear water for the usual sand and gravel pumping.

In Table I the other items of power requirements may be found and the proper calculation made for determining the kind of oil engine to be used. The column indicating the "Total Horsepower Including Average Losses" gives friction losses in power transmission, power absorbed by pumps for water circulation, and power required for air compressors, line-shafts, and other auxiliaries usually found with the type of oil engine dredge illustrated. There is also an allowance for the operation of a cutter head which is frequently used where the digging is in hard material. This estimation is made on the basis of 10% solids and average velocity.

The allowances have been made to cover the general operating conditions and are distributed per one foot of total head so that it is easy to calculate the power requirements if the total head has been ascertained. The power requirement at its maximum should never exceed the rated horsepower of the engine, and really should be 10 or 15% less so that the excess, plus the small overload capacity of the engine, would always be available to help out in unforeseen conditions.

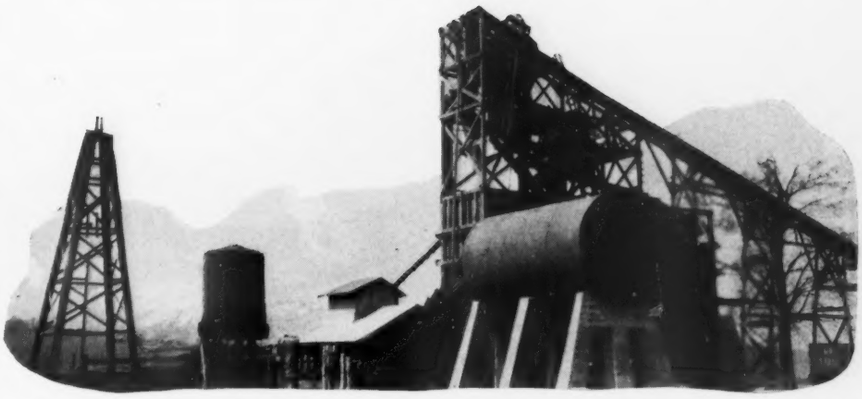


Fig. 11. The plant of the Wynne Sand and Gravel Co., at Wynne, Ark., operated by a 120-hp. oil engine located in the small structure to the left of the plant

Selection of Pumping Unit for Dredging

Usually the conventional type of gravel pump is used as shown in Fig. 13. If a commercial pump is used, the variation in diameter of the runner available with each size is limited, and usually they are designed for only one size. The variation of peripheral velocity is therefore obtained by a variation of the speed, and not by a change in the diameter of the runner. In oil engine plants (which are usually direct-connected) there is a limit to the possible variation, as the diameter of the runner and the revolutions per minute determine the head against which the pump will operate or deliver with efficiency. Table II gives the sizes of runners for different sizes of commercial sand and gravel pumps.

TABLE II

Size of Pump inches	Diameter of Runner, inches
6	25
8	30
10	31—32
12	39—40
15	40—50

Single suction pumps are exclusively used with inclosed runners, and are equipped with wear-resisting liners largely of manganese steel composition. In many cases in order to avoid a costly pump of slow speed construction where the investment is not warranted, a layout similar to the dredge illustrated in Fig. 14 is used. This is where a speed greater than the engine is used for the pump, and the pump and other machinery are driven by belts.

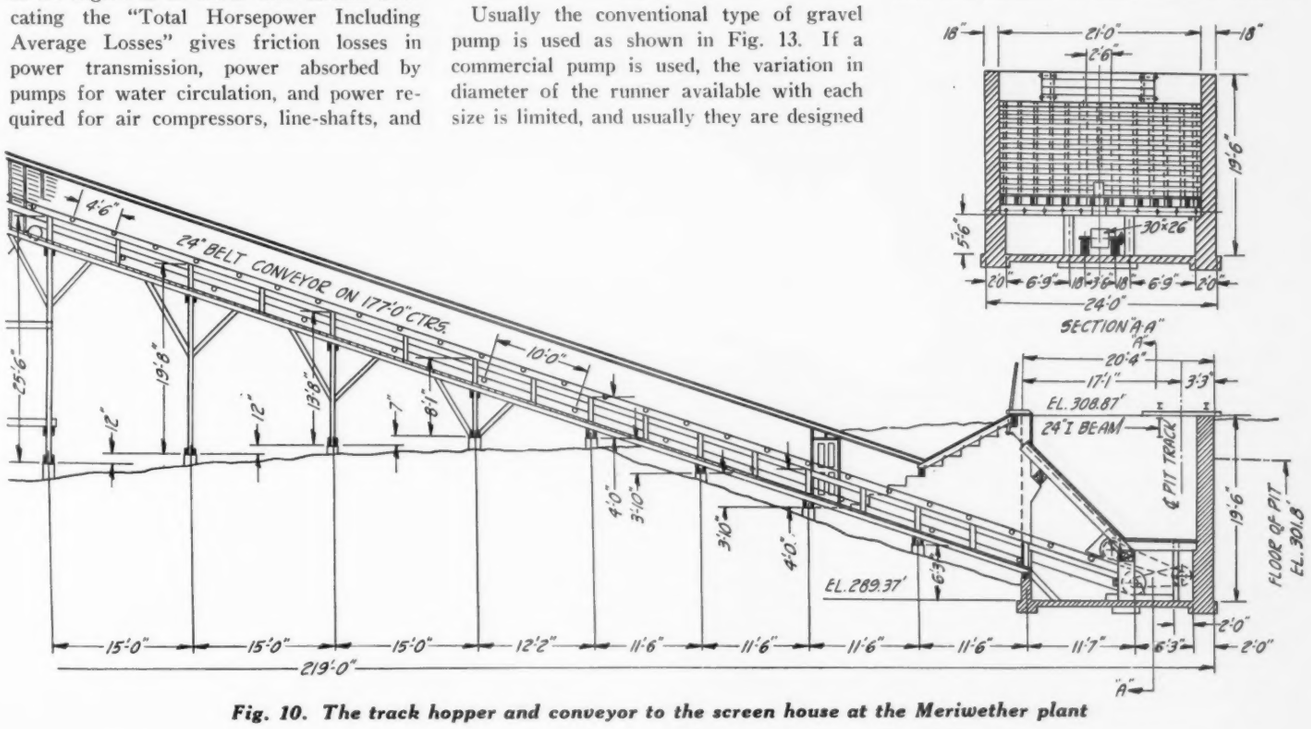


Fig. 10. The track hopper and conveyor to the screen house at the Meriwether plant

Calculating Efficiencies and Heads

We are able from the above data to find out the net head or water horsepower required. For this purpose we may derive a

TABLE III—CUBIC YARDS OF MATERIAL PUMPED PER HOUR (PER CENT SOLIDS)

Velocity (ft./sec.)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
								6-in. Pipe								
10	13	16	18	21	23	26	29	32	34	36	39	42	44	46	49	52
11	14	17	20	23	26	28	31	34	37	40	43	46	48	52	54	56
12	15	19	22	25	28	30	34	38	41	44	47	50	53	56	59	60
13	17	20	24	27	30	34	37	40	44	48	50	54	57	60	64	68
14	18	22	25	29	33	36	40	44	47	50	54	58	62	66	69	72
15	19	23	27	31	35	38	43	46	51	54	58	62	66	70	74	76
								8-in. Pipe								
10	23	28	32	37	42	46	51	56	60	64	69	74	79	84	88	92
11	25	30	35	41	46	50	56	60	66	70	76	82	87	92	97	100
12	28	33	39	44	50	56	61	66	73	78	83	88	95	100	105	112
13	30	36	42	48	54	60	67	72	78	82	90	96	103	108	114	120
14	32	39	45	52	58	64	72	78	84	90	97	104	110	116	123	128
15	35	42	48	56	63	70	77	84	90	96	104	112	118	126	132	140
								10-in. Pipe								
10	36	43	50	58	65	72	80	86	94	100	108	116	123	130	137	144
11	40	47	56	64	71	80	88	92	103	112	119	128	135	142	151	160
12	43	52	61	69	78	86	96	104	112	122	130	138	148	156	165	172
13	47	56	66	75	84	92	103	112	122	132	140	150	160	168	178	184
14	50	60	71	81	91	100	111	120	131	142	151	162	172	182	193	200
15	54	64	76	87	97	108	119	128	141	152	162	174	185	194	206	216
								12-in. Pipe								
10	52	63	73	83	94	105	115	126	136	147	157	168	179	189	200	210
11	57	69	80	92	104	115	127	138	150	162	173	185	197	208	220	230
12	63	75	88	100	113	126	138	151	164	177	189	200	215	227	240	252
13	68	82	95	108	123	137	149	164	178	192	204	218	232	246	260	274
14	73	88	102	117	132	147	161	177	191	203	220	236	251	265	280	294
15	78	94	110	125	141	157	172	190	205	222	236	252	270	283	300	314

formula.

Let WHP (water horsepower) equal the cross-sectional area of the pipe at the discharge, in square feet (A) multiplied by the velocity of the mixture (V), times the weight in the discharge pipe (W), times the total head (H) in feet per second, and divided by the figure for footpounds per second, (approximately 550, meaning one horespower). Hence,

$$WHP = \frac{A \times V \times W \times H}{550} \quad (1)$$

As the efficiency of dredging pumps under average conditions is practically 50%, the brake horsepower requirement will then result from multiplying the water horsepower by two and the rated horsepower of the engine should in all cases be at least this much to avoid overloading. If the computed horsepower is less, however, than the maximum power which the pump can absorb under the low head conditions mentioned above, the latter figure rather than the formula must then be used.

The size of pump selected bears a direct ratio to the head against which it must work. The diameter of the impeller and the revolutions per minute must conform to this ratio, given for practical purposes in the formula;

$$V^2 = 2gh \quad (V = \sqrt{2gh}) \quad (2)$$

where V is the velocity of the periphery of the runner in feet per second, g equals 32.16 and h is the total dynamic head in feet of water. If this is used in selecting the runner, the pump should operate satisfactorily. Efficiencies should in no case be estimated at a value more than 50% even under best the conditions, for such errors have caused the selection of engines too small for the service. Table III will be found practical in arriving at the amount of material pumped when the velocity and percent of solids are considered.

Attention has been called to the simplicity of the layout of the oil-engine-driven dredge. From the illustrations it will be noted that the usual equipment on the dredge proper, in addition to the engines and pumps, comprise merely the engine auxiliaries as follows:

Air starting equipment.
Fuel and oil equipment, tanks, etc.
Pump and drive for circulating cooling water.
Priming and bilge pumps.
Anchor hoists, rigging, an drive for cutter.
Lighting and heating apparatus.
Suitable clutch and other drives.
Auxiliary generator.

Cost of repair and maintenance of oil-engine-driven plants has not been a serious factor where proper attention has been given to the design of the boat and the size of engine used. Operating procedure of the right kind, such as is necessary on most dredges, assures sustained operation and maximum reliability. The engines like any machinery must be kept clean, adjusted and properly cooled and lubricated.

The heavy-duty type of stationary engine, both for dredges, tug boats and land plants, have been more widely used in this service, than the higher speed and lighter marine engines as the latter are unnecessary and more costly as a rule.

Special Requirements

Certain special equipment and devices, which are by no means absolutely necessary, and which are not found on all installations, are, however, recommended as a result of a survey of several operating units using this type of prime mover. The owners believe that these additions add years of life and more satisfaction to the operation. The following are recommended:

(1) Air filters should be used. The dust, sand, grit and windblown matter present around these plants make the use of air filters specially important to insure pure air, without dust or sand getting into the cylinders, since these impurities would cause excessive wear on the liners.

(2) Oil filters for fuel and lubricating oil should be used to protect the engine from impure oil and fuel, as the necessity for continuous and uninterrupted operation, which is not always possible without this equipment, is apparent. Transfer of the oil and fuel through a closed system is recommended and is also often found in practice.

(3) The exhaust system should be properly installed, assuring a free access for cleaning the system and keeping it in the best condition, since the severe operating duty of these engines calls for absolutely

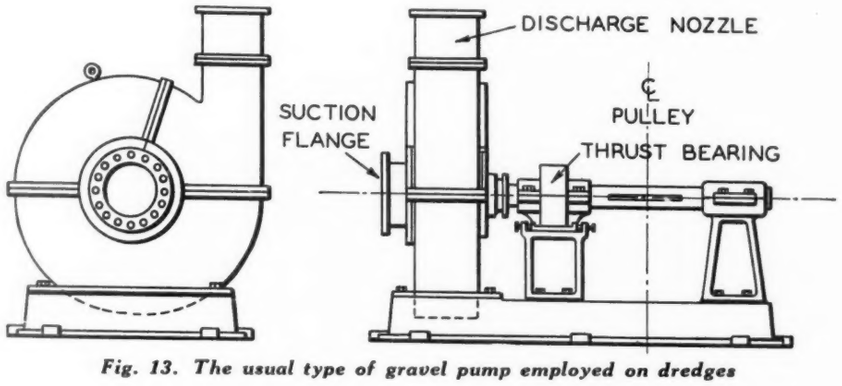


Fig. 13. The usual type of gravel pump employed on dredges

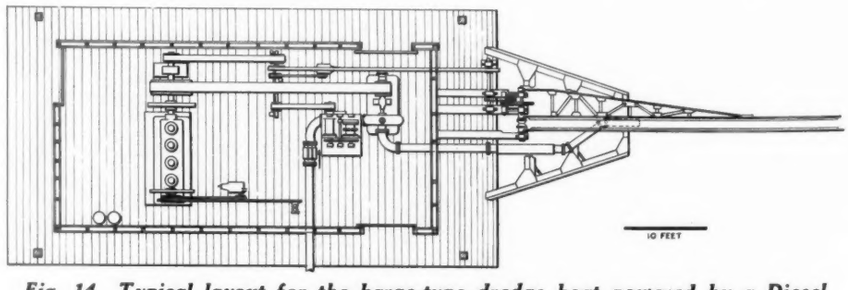


Fig. 14. Typical layout for the barge-type dredge boat powered by a Diesel engine and equipped with belt drives

COMPARISON-OIL ENGINE PURCHASED POWER & STEAM

DEISEL FUEL OIL RATES OF CONSUMPTION LBS. PER BHP PER HOUR		FUEL COST PER BRAKE H.P. HR. 300 DAYS-10 HRS. DAY PRICE OF FUEL OIL					FUEL COST PER BRAKE HP. HR. 300 DAYS-24 HRS. DAY PRICE OF FUEL OIL			
BUILDERS GUARANTEE		$.04	$.05	$.06	$.07	$.08	$.05	$.06	$.07	$.08
.40		8.45	7.40	9.68	11.29	12.90	19.35	23.22	27.00	30.96
42		6.75	8.45	10.14	11.83	13.52	20.25	24.30	28.35	32.00
.45		7.20	9.00	10.80	12.60	14.40	21.60	25.92	30.24	34.56
MOTOR-ELECTRICITY		PRICE OF CURRENT PER KWH.					PRICE OF CURRENT PER KWH.			
EFFICIENCY OF MOTOR	KILOWATTS PER HP. PER HR.	$.01	$.02	$.03	$.04	$.05	$.01	$.02	$.03	$.04
.80	.932	27.96	55.92	83.88	111.8	139.8	67.10	134.20	201.3	268.4
.85	.878	26.34	52.58	78.02	105.3	131.7	63.20	126.40	189.6	252.9
.90	.829	24.87	49.74	74.51	99.48	124.	59.61	119.40	178.1	238.8
STEAM-COAL FUEL		PRICE OF COAL PER TON					PRICE OF COAL PER TON			
LBS. OF COAL PER HP. HR.		$4.00	$5.00	$3.00	$7.00		$4.00	$5.00	$6.00	$7.00
2		12.00	15.00	18.00	21.00		28.80	36.00	43.00	50.40
3		18.00	22.50	27.00	31.50		43.20	54.00	64.80	75.60
4		24.00	30.00	36.00	42.00		57.60	72.00	86.40	100.80
5		30.00	37.50	45.00	52.50		72.00	90.00	108.00	126.00

Table IV. Chart for estimating fuel costs both for oil-driven and steam-driven operations

clean exhaust with no back-pressure.

(4) Because the engines often operate under severe and long continued overload the use of pyrometers is necessary to keep a careful watch over the operating temperature, lubricating temperature, etc.

(5) Accurate and quick regulating governor action is necessary because of the changing load conditions, and sometimes on some types of engines, over-speed governors are required to help out in this case.

In land plants where the water used carries a high percentage of scale-forming solids, it is not advisable to circulate the raw water as cooling water for the engines. In such cases, a closed cooling system circulating only treated and softened water is necessary for continued service and is highly recommended by those who have had the experience. Most of the best installations are equipped for circulating safe cooling water in the engines, and no trouble from scale is reported where this provision is made.

Estimating the cost for fuel and lubricating oil and making a comparison with the fuel costs of other types of primary or purchased power is a simple problem when the necessary factors are known. The average oil engine has a fuel consumption of from 0.4 to 0.5 lb. per brake horsepower, or about 15 horsepower-hours per gallon of fuel. Table IV is attached for convenient estimation and comparison of the various types.

Conclusions

While only a few typical illustrations have been given here, there are in service scores of oil-engine-driven dredges, tugs, and land plants, using a great many different types and designs of these engines. In a great many plants with which the writer is familiar, the same points are evident practically universally. Among the conclusions are included the following:

(1) Heavy duty or stationary types of engines are preferred and are in general use. The higher speed and lighter weight engines have begun to appear in this service, however.

(2) The Diesel-electric, or a combination having a direct connection to the pump with an auxiliary generator for electric-driven auxiliaries and magnetic clutches, is the usual drive. Direct-connected units are more generally found than belt-driven units.

Fig. 12. The oil engine at the Wynne plant

(3) The box or barge type of dredge boat, with its very marked saving and economy of space and its simplicity of design and construction, is much used on rivers and shallow waters.

(4) The more careful designs of boats and plants are marked by provisions for sufficient auxiliary apparatus and protecting devices.

(5) In stationary and land plants, very good stationary oil-engine practice in both design and operation is in evidence, showing considerable indication of proper appreciation of the Diesel engine in this industry.

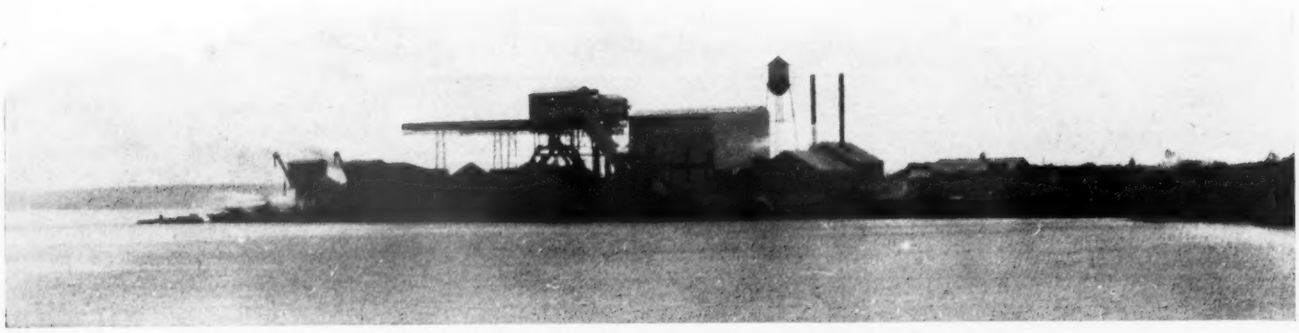
(6) Simplicity and fuel economy are by far the greater reasons for the use of oil engines in gravel plants. However, reliability is of no less importance where in many sections the purchased power does not afford the same measure of dependability.

In the greater gravel producing zones where both the market and the material from pits are favorable and where the operation is highly organized and profitable, a great movement toward electrification is taking place, and this power is largely replacing steam. However, I believe that the unusual economy, reliability and flexibility of the oil-engine-driven plant, as well as its ease of operation is not any too widely known or appreciated in some sections. Gravel producing plants of most every type and class will find the oil engine a means of more profits and more satisfactory operation. As compared with purchased power, the oil engine can show definite and tangible savings over and above the fixed charges and the cost of operation. The seasonal nature of the business in many sections makes the use of oil engines advisable due entirely to the necessary and fixed minimum charges for purchased power. In many southern sections, the storm period of the year occurs during the heavy production season, and the electrified plants suffer interruptions almost daily for months at a time. In this section the choice of oil engines as a more reliable power has been often commented upon. This reliability, aside from any thought of other economy, should contribute importantly to the consideration of Deisel power, and has already affected the matter to a very considerable extent in many parts of the country.

American Society for Testing Materials Issues New Index

THE number of standards and tentative standards of the American Society for Testing Materials has increased to such a degree (548 in all) that a complete index was deemed desirable, and accordingly such an index has been compiled in addition to the individual indexes appearing in the Society's Book of Standards. The index will be a valuable aid in ascertaining whether the A. S. T. M. has prepared a specification or test covering a given material, and if so, its title and serial designation and where it is published in its latest form. The Index now becomes a permanent annual publication.

The Society is desirous that this new publication shall reach those outside who will find it of especial value, such as users or producers of materials, and accordingly copies will be furnished, without charge, upon receipt of a request, by R. E. Hess, assistant secretary, at 1315 Spruce St., Philadelphia, Penn.



General view of the plant of the Dominion Trap Rock Co. at Bruce Mines, Ont., as seen from the site of Quarry No. 2

Dominion Trap Rock Company's Operation at Bruce Mines, Ontario

North Shore Georgian Bay Plant Ships Largely to Great Lakes Ports

THE CANADIAN DEPARTMENT OF MINES shows, on its geological map of the trap rock deposits on the north shore of Lake Huron, several scattered areas where trap rock or diabase is present. The deposits are all at the water's edge and are located, to be more exact, on the north shore of Georgian Bay. The largest of these areas starts at a point about 40 miles east from the Canadian Sault Ste. Marie and extends along the coast a distance of roughly ten miles and at points recedes back into the mainland several miles. These scattered deposits are not entirely bound on their southern portion by the lake front, as the central portion is overlaid with drift material. That portion of the deposit of commercial importance is at the western end of the areas and near Bruce, Ont. Here are located the operations of the Dominion Trap Rock Co., Ltd.

The whole area is a diabase trap rock, although at places there are some schists. Scattered through the diabase are found stringers of quartz, some of which is highly mineralized, and these portions of the region were, years ago, developed for the copper-gold content. Adjoining the property of the trap rock company is one of the old mills of the early mining company, and one of that company's caved stopes is an interesting exhibit near the quarry. This particular stope was so close to the No. 1 quarry that one of the coyote-hole shots lost some of its effectiveness from back-firing to this zone. A few miles west of the quarry is an old smelter, one of the earliest copper smelting operations in America. This smelter has long been out of operation and only a crumbled pile of ruins marks the spot as one of historical interest.

An Interesting History

The plant of the Dominion Trap Rock Co., Ltd., was first built by Samuel B. Martin and operated briefly under the name of Martin's International Trap Rock Co. The plant was briefly described in the September 17, 1914, issue of ROCK PRODUCTS. The preliminary stages of the crushing and conveying operations as described there are practically the same as today, although at the finishing end many changes have been made.

In 1917 the management was changed to the Edward Bros., of the American Sault Ste. Marie, and the Tabor interests of Alpena, Mich. In 1927 the plant was purchased by Perry E. Haworth through E. P. Smith, who represented the Alpena owners, for the Dominion Trap Rock Co., Ltd., which was organized in Montreal, Que., and financed through the stock exchange houses of Grier Investment Co. and Williams, Partridge and Rapley. A. A. MacKay of the firm Alderson, MacKay and Armstrong was elected president; Gordon Scott, of P. S. Ross and Sons, and C. B. Grier, vice-presidents, and Frank E. H. Gates, secretary-treasurer. The directors of the company are A. A. MacKay, Gordon Scott, Ernest Rossitier, of the St. Lawrence Paper Co., C. B. Grier, president of the Grier Investment Co., and J. A. Raymond, of Williams, Partridge and Rapley. The executive offices are at 921 New Birks Building, Montreal. A. A. MacKay, W. P. Alderson and Dr. P. Armstrong are well-known consulting engineers of Canada and are executives of several of Canada's productive mines, among which are the Towabamac Exploration Co. (Aldermac mine), and the Amulet mine, as well as consulting engineers for several other mine operators.

The old plant of the first company was revamped at a cost of $400,000, and the present value of the company's plant and quarry equipment was recently appraised by the Canadian Appraisals Co. at $700,000. During the present winter the reconstruction program will be completed at an additional cost of $300,000. These changes will give the plant a capacity of 3000 tons per 10 hours, whereas the present capacity is 2000 tons per 10 hours. Owing to the extremely cold weather during the winter months, the thermometer registering about 30 deg. below zero for prolonged periods, and ice freezing to a depth of 40 in., the operating season is confined to about 200 days per year, between May 1 and December 1.

Makes Own Power

All of the various units in the plant are driven by individual motors, power being supplied at 550-volts, 3-phase, 60-cycles from the company's own steam-powered generating plant. There are two 450-hp. Erie boilers equipped with Foster superheaters. The boilers are mechanically stoked by Jones "Imp" under-feed mechanical stokers. The boilers are in the usual Erie setting, water-tube, and are built for 175-lb. operating pressure.

The two boilers serve, as a main source of power, an Erie City Iron Works, 1100-hp., cross-compound, Lentz, Corliss or poppet-valve engine, that is connected by a chain drive to a Westinghouse a.c. generator. This generator has the following characteristics: 750 kv.a., 550 volts, 788 amps., 3-phase, 60-cycles, 200 r.p.m., 98 ex. amps., 125 ex. voltage. The Westinghouse exciter is of the SK-DC type, 21-kw., 125-volts, 168-amps., and is directly connected to the a.c. generator.

The chain drive connecting this Lentz engine with the generator is of the Renolds roller type consisting of three strands of roller chain, with forced-feed oil lubrication, and

is rated at 1000 hp. It is said to be the largest drive of its kind in the entire British Empire. The chain drive was made at Montreal and was installed by Walter Turner, master mechanic and mill foreman for the Dominion Trap Rock Co.

An auxiliary generator, that is used for loading steamers and for lights, is part of the power-house equipment, and consists of a General Electric of Canada, Ltd., a.c. generator, type ATB, 250-kv.a., 262-amp. and runs at 600-r.p.m. This generator is driven by a single-cylinder, Erie steam engine of the same type driving the larger generator, by means of a 26-in. belt. This generator has for excitation, a General Electric of Canada, d.c. generator, type CVC, 975 r.p.m., 9½ kw. and 76-amps., belted to an outboard pulley on the a.c. generator by a 6-in. belt. This generator has a separate switchboard from the main board that serves the various departments in the plant.

The main switchboard consists of five panels; panel No. 1 controls the crusher, and No. 1 conveyor; panel No. 2, the loading dock equipment; panel No. 3, the remaining pan conveyors, screens and stock pile building equipment (high line); panel No. 4, the primary crusher; No. 5, the secondary crushers and miscellaneous equipment.

Direct-current for the Hum-mer vibrating screen is supplied by a small G.E. unit, type TLA, form C, 2.4-kv.a., 1.2-kw., and operates at 860 r.p.m. It is direct connected to 3-hp., type KI induction motor.

The power plant is housed in a separate building from the compressors and is of concrete block and fabricated steel.

The crushing plant is located on the waterfront and the ground level of the plant is only a few feet above the level of the lake. The dock consists of four timbered bulkheads or dolphins, strengthened by backing with rock, set parallel to the shore line, and lake cargo boats can draw up alongside of the plant for loading.

The harbor at this point is being dredged to a depth of 20 ft. 6 in. through the cooperation of the Dominion government. The company has received from that source $80,000 for harbor work. This work is being directed by W. J. Fuller, district engineer of the Canadian government.

Quarry Development

Quarry development consists of three pits, Nos. 1, 2 and 3. No. 1 quarry is used for a

Perry E. Haworth, general manager of the Dominion company, and Captain Fox of the steamer "J. E. Savage"

standby, and the endeavor is to keep 50,000 tons of broken rock ahead at this pit. At present this quarry is used as the principal supply of stone, while pits Nos. 2 and 3 are being opened up for production. Some stone is now being taken from pit No. 2, which is located 4200 ft. east of the plant; and this ledge will ultimately yield 1,600,000 tons of trap rock. Quarry No. 3 has not been opened up yet, but it is by far the largest potential producer of the three, and will yield 70,000,000 tons. The development work previously mentioned will include building a standard gage spur one mile in length to this site and installing a compressor.

The rock is a hard, dark-colored diabase, somewhat shattered, with no well-defined bedding planes and with a great number of both vertical and horizontal cracks. Owing to the difficulties encountered in attempting to drill this rock under the ordinary well-drilling practice, the company resorted to blasting by the "coyote" or "gopher-hole" method, and has been very successful, producing a large tonnage of well-broken stone per pound of powder. The troubles encountered in drilling this deposit with well drills were mostly caused by stuck drill stems. There are many old, bent, drill stems lying around the quarry floor, shot loose by later blasts, that testify to these early troubles.

In using the coyote-hole method the face of the quarry must, of necessity, be cleaned up before the tunnels for the next series of shots can be even started; and for that reason, either a long quarry face is necessary, or more than one quarry must be operated. Here the two-quarry method is used, quarry No. 1, which is within a few hundred yards of the plant, being used as a scource of stone, while coyote tunnel driving operations are in progress at quarry No. 2, and vice versa.

Blasting Practice

Quarry No. 1 is roughly 900 ft. long and is worked from one bench that will average 35 ft. high. At 55- to 58-ft. centers a small tunnel, about 3½x4 ft., is driven at right angles to the quarry face, and on the same elevation as the quarry floor. These tunnels are driven a distance of 30 to 40 ft. in from the face and cross tunnels, or drifts, are then run both ways at right angles to the long axis of the main tunnel. The lengths of the cross tunnels are 9 to 35 ft. The tunnels are

The crushing plant, particularly showing the two long stock-piling conveyors at the right. Note the extended portion of each conveyor to the right of the outward support, so built to insure easy access to the piles when the stone is to be reclaimed

A portion of the face of Quarry No. 1, with entrances to two coyote tunnels shown

Coyote tunnel ready for back-filling with the protected fuse in place at the left side of the hole

so small that it is difficult to crawl into them, even on hands and knees.

For drilling in the coyote holes a Gardner-Denver Model 11 drill, with water attachment, is mounted on a cradle, or mounted on a 3½-ft. bar; and holes are drilled to a depth of 3 ft. Usually nine ⅞-in. holes are sufficient to break the ground and pull about 4 ft. The cost per foot of tunnel is from $5 to $7, depending on conditions. Drillers are paid 59 cents per hour and muckers $3 per day of 8 hours, three shifts per 24-hour day. A 60% "Forcite" gelatine dynamite was used, but the company is now trying a 50% strength for the headings.

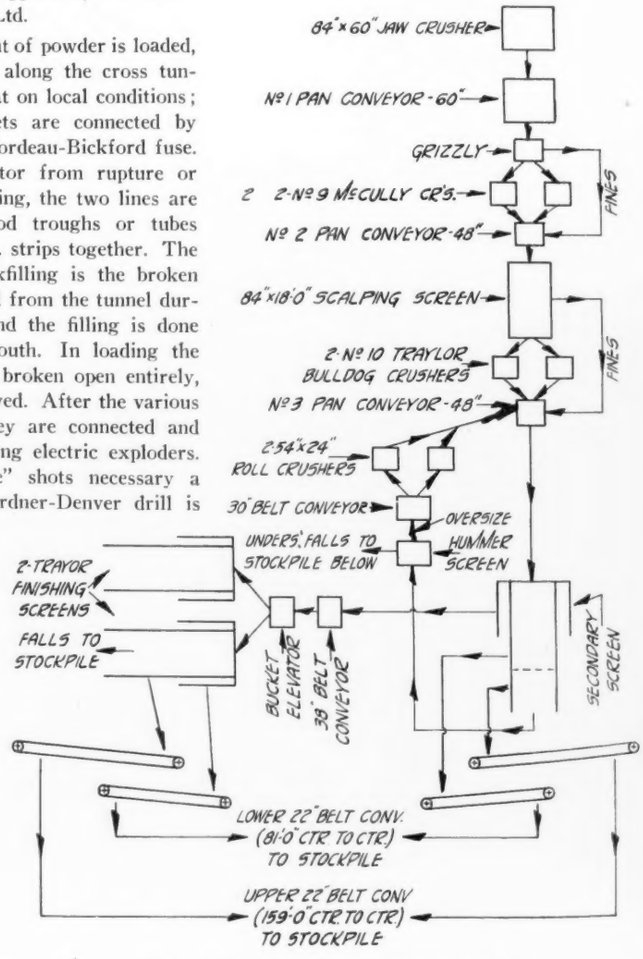
To remove the muck, a track made out of 2x4's is built to the face, where the rock is loaded into small cars. The car body is an old powder box mounted on small, flanged wheels. The cars are so small and light that when they are filled with muck the loader gives them a quick shove, and they run by themselves to the tunnel mouth, where another man unloads the car by simply dumping the box, and returns the car to the face by the same method. When the tunnels and powder pockets are completed a survey is made and a calculation as to the probable yardage that will be broken is secured. From these data ⅝ lb. of powder is loaded for every yard of rock that is to be broken by the shot. One cubic yard of this rock weighs 2.4 tons, and on this basis gives 3.84 tons of trap rock per pound of explosive. This amount of powder gives very good results, and D. H. MacKay, quarry superintendent, says that ½ lb. of powder per yard will in most cases give the results he wants. With the higher powder ratio a larger break is secured, as well as considerable over-break; and the tendency probably will be to use the larger charge in most cases.

In a recent shot at No. 2 quarry, 14,000 lb. of powder was used and 21,000 cu. yd. or 50,400 tons of rock was loaded from the shot, giving 3.6 tons of rock per pound of explosive. The powder used comes in 4x8-in. cartridges, and is supplied by the Canadian Explosives Co., Ltd.

The calculated amount of powder is loaded, usually, in four places along the cross tunnel, depending somewhat on local conditions; and the powder pockets are connected by two separate lines of Cordeau-Bickford fuse. To protect the detonator from rupture or breakage while backfilling, the two lines are enclosed in small wood troughs or tubes made by nailing 1x2-in. strips together. The material used for backfilling is the broken stone that was removed from the tunnel during its construction, and the filling is done clear to the tunnel mouth. In loading the powder boxes are not broken open entirely, only the tops are removed. After the various pockets are loaded they are connected and fired with one cap, using electric exploders. For drilling any "toe" shots necessary a No. 7 sinker type Gardner-Denver drill is used, and holes up to 15 ft. in depth are put in, using 1-in. hexagonal steel.

Quarry Loading

Loading is done by a Bucyrus 90-C, coal-fired, standard railroad type shovel, equipped with a 4-yd. dipper. This loads to 12-yd, air-dump, Western cars, which are hauled from No. 1 pit in trains of four cars, and from No. 2 pit in trains of six cars by Vulcan steam, coal-fired locomotives. In pulling out of No. 1 quarry, there is a small grade to overcome, while at the other quarry the



Flow sheet for the Bruce Mines plant

A coyote shot at the quarry of the Dominion operation

track to the crusher is practically level.

When the new quarry is opened up, the company expects to purchase additional equipment, shovels, locomotives, cars, etc., so as to secure additional tonnage.

There are two compressor plants. No. 1 is located at the mill and provides air for quarry No. 1. The second compressor is at the site of No. 2 quarry. Details of these two installations are given in the following condensed table:

	Quarry No. 1	Quarry No. 2
Capacity, cu. ft. per min.	300	600
Make of compressor	Both Carels, Ingersoll-Rand,	
Type	Both Ingersoll-Rand, oil engine driven	
Class	V-2	POC-2
Size cylinders	15x12x10½	17x19; 16½x13¼x19
Size receivers	4x12	4x12
Starter	Hand	Air*
Pressure, lb. per sq. in.	100	100
Fuel	Diesel oil	Diesel oil
Size air line to receiver	4-in.	6-in.
Size air line to quarry	.....	3-in.

*Vertical, gasoline-driven, "Novo" compressor with a 1½x5-ft. receiver.

Crushing

The rock is hauled to an 84x60-in. Allis-Chalmers, "Superior," jaw crusher driven through a countershaft by a 250-hp., 600-r.p.m. English Electric Co. motor. The countershaft is belted to the motor by a 20-in. belt, and the countershaft connects with the crusher through an Allis-Chalmers rope-drive, 2-in. manila rope, 6 ropes. The crusher sheave runs at 94 r.p.m. The crusher is served by a 30-ton, hand-operated crane. A second 30-ton crane runs on a suitable track the entire length of the plant.

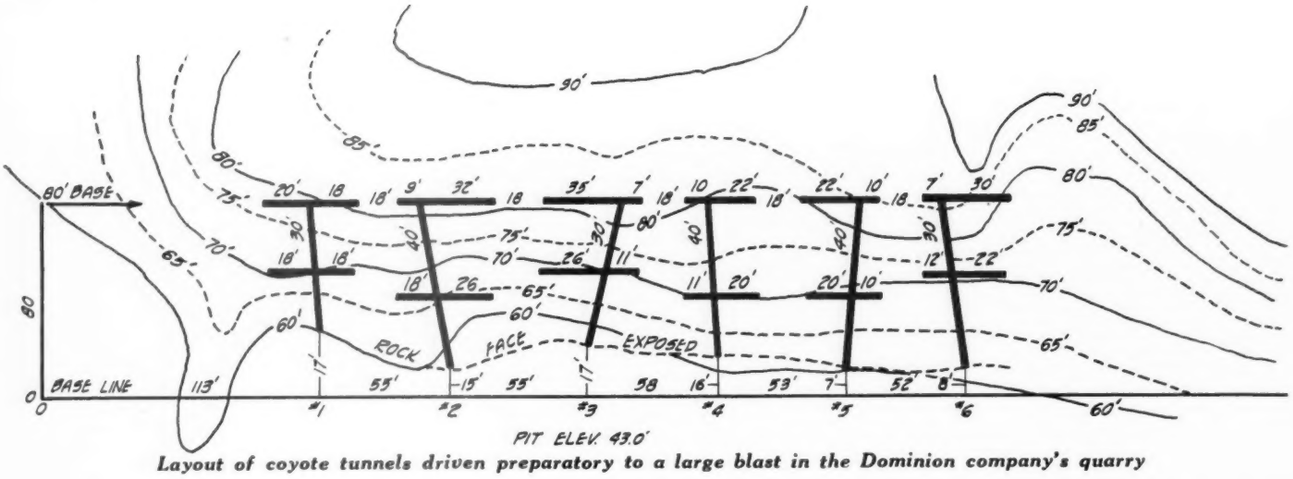
The primary crusher, which is set to discharge a 10-in. product, delivers to a 60-in. Stephens-Adamson pan conveyor of 94-ft. centers. This pan conveyor, known as No. 1, elevates the rock a vertical distance of 42 ft. 8 in. and conveys it a horizontal distance of 86 ft. 9 in., discharging to a grizzly of 70-lb. rails spaced to 3 in., 15 ft. long. This conveyor is direct connected at the head shaft by gear reductions to a 50-hp. slip-ring, Westinghouse motor.

The oversize from this grizzly falls to two No. 9, McCully gyratory crushers, with smooth heads, set to 3½ in. To slow up the velocity of the falling rock a hinged bumper hangs in the path of the rock as it passes to these crushers. The secondary crushers are driven by two 125-hp. Canadian Westinghouse motors, running at 870 r.p.m., with power transmitted through 1½-in., 6-rope drive. At present the motor is belted to a countershaft by a 16-in. belt, and the No. 9 crushers are rope-driven from this shaft. This winter the drive is being changed and the crushers will be driven direct from the motors by rope drives, eliminating the countershaft altogether.

The No. 9, McCully, secondary crushers, discharge to a 48-in. pan conveyor (called No. 2), with 76-ft. centers, that elevates the stone a vertical distance of 50 ft. and conveys it a horizontal distance of 55 ft. 8 in. The fines from the rail grizzly ahead of the No. 9 McCully crushers fall by gravity through suitable chutes, and join the secondary crusher discharge at the boot of this pan elevator.

A view in Quarry No. 2, showing effect of a primary coyote shot. The auxiliary repair shop is in the left background

The abandoned stope of an early copper-gold mine adjoining the property of the Dominion company



Layout of coyote tunnels driven preparatory to a large blast in the Dominion company's quarry

No. 2 conveyor discharges to an 84-in. by 18-ft. rotary scalping screen with 2½-in. perforations its full length. This scalper was supplied by the former Power and Mining Machinery Co., of Milwaukee, Wis., and is driven by a 75-hp., 900-r.p.m., English Electric Co. motor through 1¼-in. rope drive of three strands. This motor also drives the pan conveyor. The fines from this scalper fall to a third pan conveyor. Pan conveyor No. 2 is driven by a 75-hp., 900-r.p.m., English Electric Co. motor through a 4-strand rope drive, 1¼-in. rope, that connects with gear reductions at the head pulley. The scalper screen is driven from the head pulley of this conveyor by a 3-strand rope drive of 1-in. rope.

Four-yard shovel loading in No. 2 Quarry

The oversize from this rotary screen falls to two 10-in. Traylor "Bulldog" gyratory crushers, the discharge of which falls to the No. 3 (48-in.) pan conveyor, joining the fines from the scalper screen. The "Bulldog" crushers are driven by 100-hp., squirrel-cage motors, 870 r.p.m., with 16-in. belts.

No. 3 pan conveyor is the longest one in the plant and is built on 116-ft. centers, inclined at an angle of approximately 45 deg. This conveyor discharges to an 84-in. by 18-ft. Power and Mining rotary screen with 12 ft. of 1½-in. holes at the feed end, and 6 ft. of 2½-in. holes at the discharge end. This screen is equipped with a 10-ft. dust jacket of 1-in. mesh wire-cloth. The third or long pan conveyor and the secondary screen are driven by a Canadian Westinghouse motor, type HW, 100-hp., 870-r.p.m., 550-volts, 3-phase, 60-cycle. A 6-rope (1¼-in.) drive connects the motor with the head pulley, that drives the conveyor through gear reductions, and the secondary screen is driven from this head shaft by a 5-rope (1-in.) drive.

Sizing

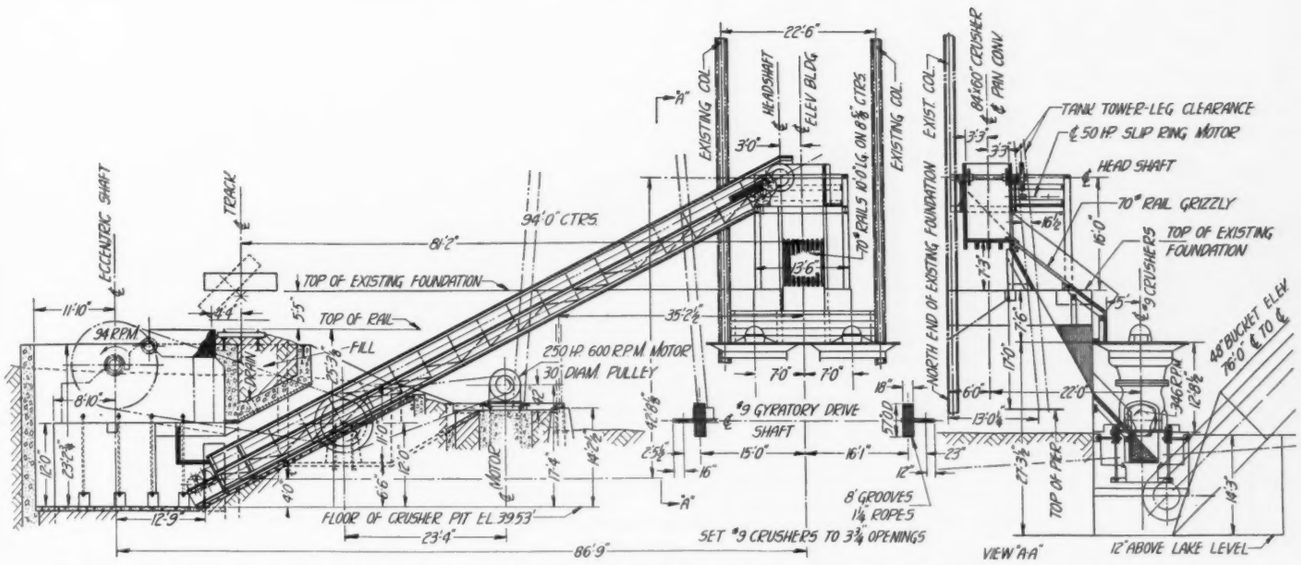
The oversize from the secondary rotary screen drops by gravity to a Hum-mer screen set directly under the rotary, and this screen serves to further clean the oversize from smaller rock before it falls to a 30-in. belt conveyor that conveys the oversize to two pairs of 54x24-in. Superior rolls supplied by the Power and Mining Machinery Co. Only one of the pairs of rolls is used at present, driven by a 75-hp. English Electric Co. motor running at 1200 r.p.m. This motor is connected with a countershaft by a 12-in. belt. Eight 1¼-in. ropes drive the rolls from this countershaft. The rolls run at 58 r.p.m., and if additional fines are desired they can receive more feed from a hopper under the secondary screen. The discharge from the rolls falls to the No. 3 pan conveyor, making a closed circuit for the oversize from the second rotary screen. The 30-in. return conveyor to the rolls is driven direct from the shaft of the Superior rolls.

One of the miniature haulage cars for handling muck from coyote tunnels and for back filling

The fines from the Hum-mer screen fall direct to the storage pile below.

The secondary screen produces, besides the oversize, three products, a 1½ to 2½-in.

No. 1 Quarry as seen from the plant



Elevation and foundation details for the installation of the 84x60-in. jaw crusher and the 60-in. pan conveyor at the Bruce Mines plant

size, a 1 to 1½-in. and a minus 1-in. size. The 1½ to 2½-in. size falls direct to a 22-in. belt conveyor, 159-ft. centers, running parallel to and 68 ft. above the ground line, and parallel to the long axis of the screen. This conveyor discharges to ground storage below. The second product (1 to 1½-in.) falls to a second 22-in. belt conveyor, that is below the longer belt, and parallel to it, but 62 ft. above the ground. This belt has a length of 81 ft., center to center, and likewise discharges to ground storage. The longer of these two storage-pile building conveyors is driven by a 10-hp., English Electric Co. motor running at 900 r.p.m., and is belted to the head pulley of a gear reduction unit.

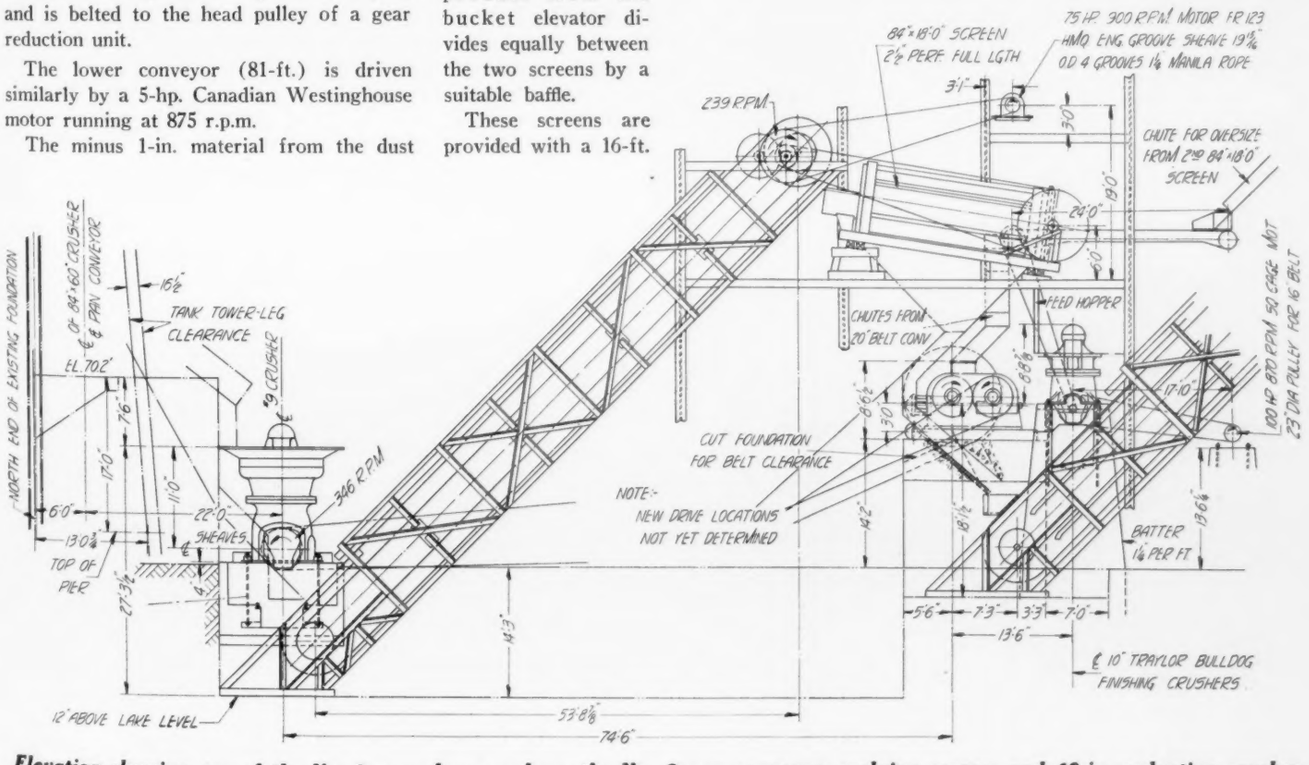
The lower conveyor (81-ft.) is driven similarly by a 5-hp. Canadian Westinghouse motor running at 875 r.p.m.

The minus 1-in. material from the dust jacket of the secondary screen falls to a 38-in. cross-belt conveyor that elevates the rock slightly, and discharges to the boot of a 38-in. Stephens-Adamson bucket elevator, serving two 78-in. by 20-ft. Traylor rotary screens. The two screens, the bucket elevator and the 38-in. cross conveyor are all driven from a countershaft by a 60-hp. English Electric Co. motor running at 720 r.p.m. The countershaft is belted to this motor by a 12-in. belt.

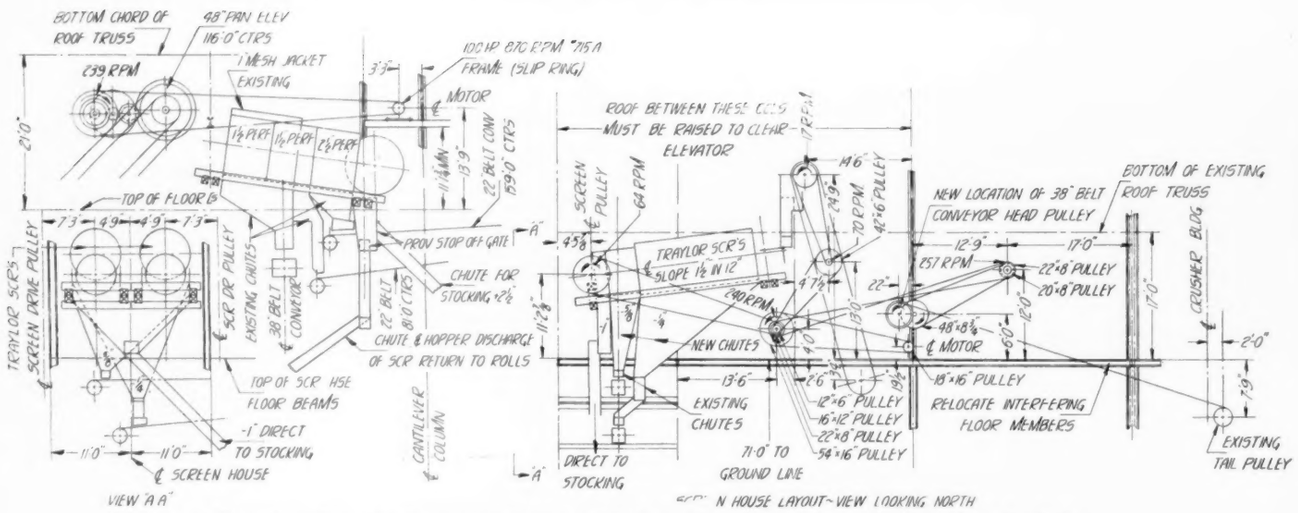
The two rotary screens are identical and placed parallel to the direction of travel of the 38-in. cross conveyor. The discharged product from the bucket elevator divides equally between the two screens by a suitable baffle.

These screens are provided with a 16-ft. dust jacket of ¼-in. mesh wire-cloth, and the main barrel is built with ¾-in. perforations its entire length. The screens have a slope of 1½ ft.

The oversize (plus ¾-in.) from the rotary screens falls direct to ground storage below. The minus ¾- to ¼-in. size falls to a 22-in. belt conveyor, 159-ft. centers, running parallel to and 68 ft. above the ground line, and at right angles to the axis of the screens. This belt conveyor discharges to ground storage below. The minus ¼-in. size falls to another 22-in. conveyor running on 81-ft. centers located directly below and parallel


84"x18'0" SCREEN
2½" PERF. FULL LGTH
75 HP. 900 R.P.M. MOTOR FR 123
HMQ. ENG. GROOVE SHEAVE 19⅞" O.D. 4 GROOVES 1⅛ MANILA ROPE
239 R.P.M.
CHUTE FOR OVERSIZE FROM 2ND 84"x18'0" SCREEN
FEED HOPPER
CHUTES FROM 20" BELT CONV.
CUT FOUNDATION FOR BELT CLEARANCE
NOTE:- NEW DRIVE LOCATIONS NOT YET DETERMINED
100 HP. 870 R.P.M. 50 CAGE MOT. 23" DIA. PULLEY FOR 16" BELT
BATTER 1⅛ PER FT.
10" TRAYLOR BULLDOG FINISHING CRUSHERS
NORTH END OF EXISTING FOUNDATION
84"x60" CRUSHER & PAN CONVEYOR
TANK TOWER-LEG CLEARANCE
EL. 702'
9 CRUSHER
346 R.P.M.
22'0" SHEAVES
TOP OF PIER
12" ABOVE LAKE LEVEL
53'8⅞"
74'6"

Elevation showing one of the No. 9 secondary crushers, the No. 2 pan conveyor, scalping screen, and 10-in. reduction crusher

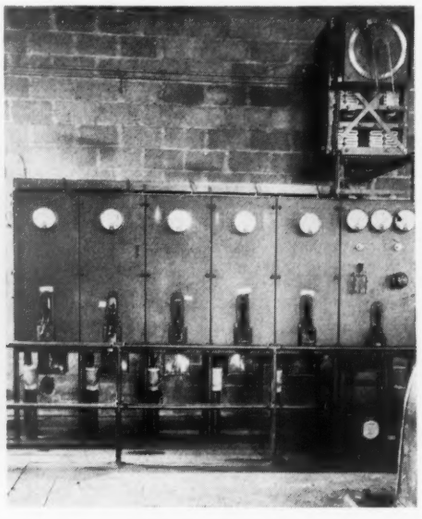


Elevation through the screen house, showing relative positions of screens and chutes

to the longer conveyor, but is 62 ft. above the ground line. This conveyor, too, discharges to ground storage. These two conveyors are similar in length, width and drive mechanism as the two described in connection with the secondary screen. They are driven by 10- and 5-hp. Canadian Westinghouse motors, respectively.

Compressor building at Quarry No. 2, with steel storage tank for Diesel oil, and wood tank for water

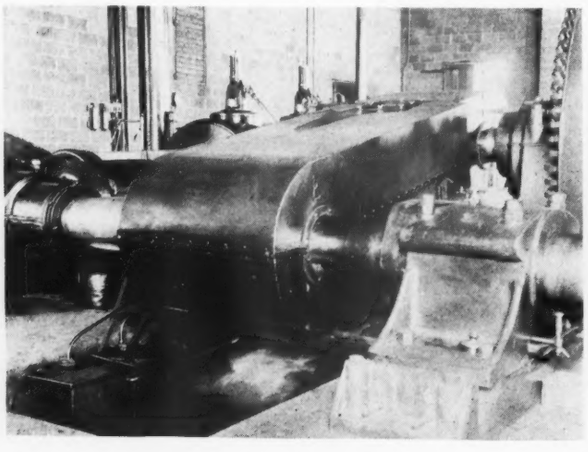
The storage-building conveyors are all 5-ply belt, the 38-in. belt is 6-ply, as well as the 42-in. reclaiming belts. All the conveyor belts were supplied by the Gutta Percha and Rubber Co., of Toronto. The carrier rolls and return rolls were supplied by the Stephens-Adamson Manufacturing Co. and are grease-lubricated by means of grease cups.



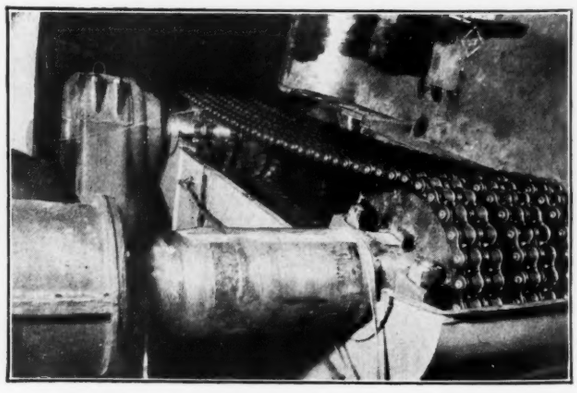
Switchboard panels in the power plant of the Dominion company

Building at No. 1 Quarry housing the compressor equipment

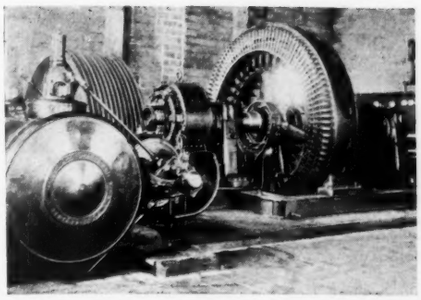
The stock-pile-building conveyors from each set of screens are housed in a corrugated-steel house, supported by steel members that rest on large concrete bases. The concrete base is in the form of a large pillar,



Large roller chain drive delivering 1000 hp. from the steam engines to the generator. Note the forced feed oil lubrication pumps in the left foreground

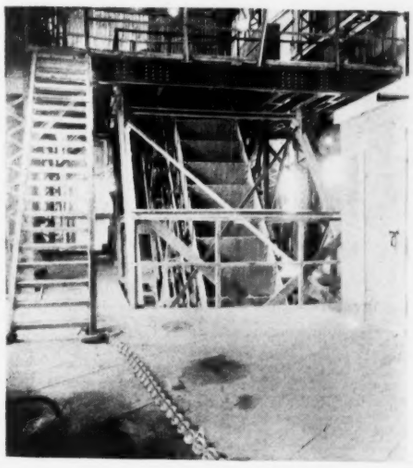


The 1000-hp. silent roller chain drive at the Dominion plant with the cover removed. This drive is said to be one of the largest units of its kind in the whole British Empire



The 750-kv.a. generator which is the main source of power. The sheave wheel is from a former line-shaft hook-up

and is of sufficient size and weight to avoid danger of the conveyors being thrown out of alignment, if rock is taken from around the base in other than equal amounts. The concrete bases are of such height that they are about on the same elevation as the top of the stock pile, when the pile is normally full. The two conveyor housings are parallel to each other, are 62 ft. above the ground and

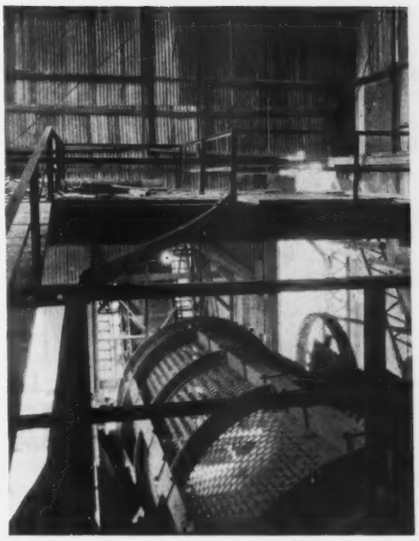


Pan conveyor No. 2 elevating the discharge from secondary crushers

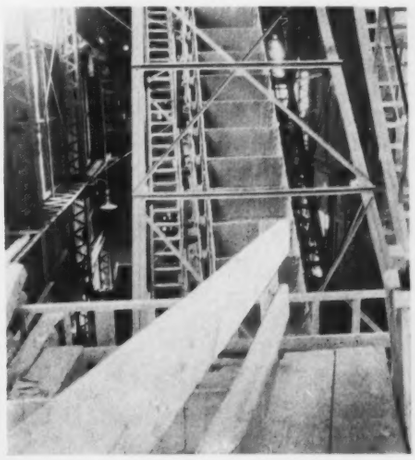
Walter Turner, master mechanic and mill foreman, with D. H. Mackay, quarry superintendent

are 80 ft. apart. The stock pile has a total capacity of 36,000 tons, of which 20,000 tons is live storage.

Under the stock pile and parallel to each of the two stock-pile-building conveyors, and also parallel to each other and separated by a distance of 80 ft., are two 7x7-ft. tunnels of steel and concrete construction, in which run 42-in. reclaiming conveyors. Crushed rock is fed to these belts by gates located about every 10 ft. along the roof of the tunnels. The two conveyors are identical as to length, type of drive, etc. The length of each reclaiming belt is 325-ft. centers, and each is driven by a 50-hp. General Electric motor belted to head pulleys of a gear reduction unit. Each belt, as it emerges from the tunnel mouth, passes over separate Merrick weightometers, so accurate weights of material shipped are obtained.



Looking down at the scalping screen at the Bruce Mines plant

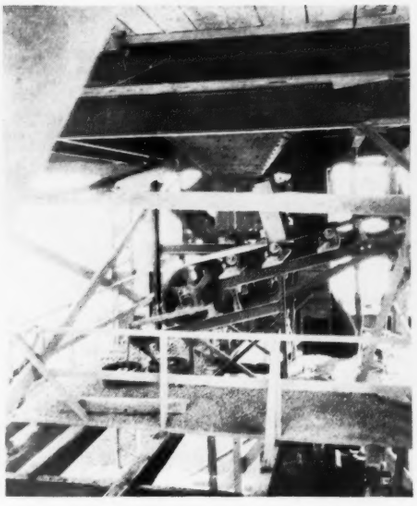


A partial view of No. 3 pan conveyor, which is the longest in the plant

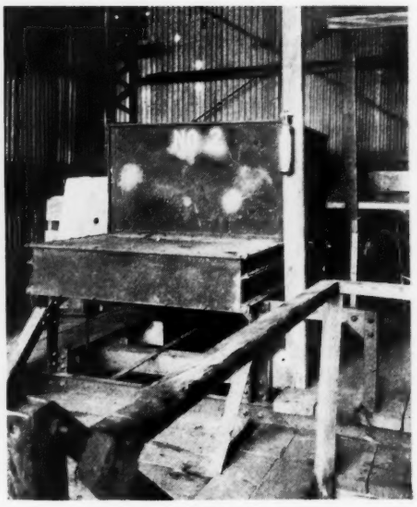
Each belt discharges to a second 30-in. conveyor that is mounted on a boom-like structure, and this belt can be raised or lowered as desired. The second conveyor is really a continuation of the reclaiming belt, but is constructed in this manner so boats with high deck structures can pass under the loading apron. When the boat is made fast and is ready to receive its load, these con-

Rock train dumping to hopper at the primary jaw crusher. The building to the left is the powerhouse

The 60-in. pan conveyor elevating material from the primary jaw crusher to the pair of secondary crushers

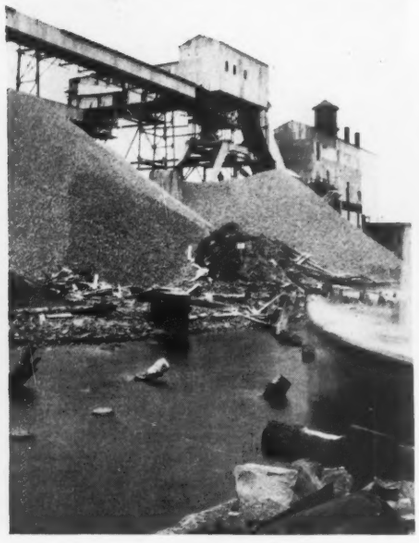


Material 1-in. and finer is carried by this 38-in. belt conveyor from the screens to the 38-in. elevator



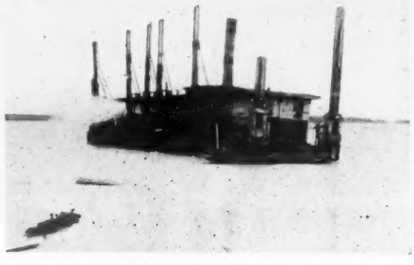
One of the pair of automatic weighers on the loading belt at the Dominion Trap Rock Co. plant

A general view of the Dominion plant at Bruce Mines, Ont., from the site of Quarry No. 1, showing, from left to right, the power house, screening plant, overhead conveyors for stock-piling, and the boat-loading equipment



Partial view of the plant and stock piles as seen from the bay near the loading docks. Note the "A" frames beneath the screen house

Deepening the harbor at the plant



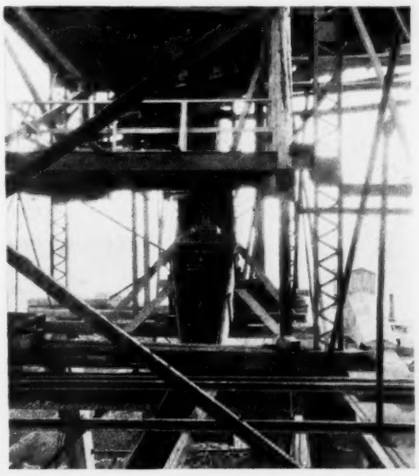
Barge equipped with steam drills

Reinforced concrete "A" frames support the secondary screen house. Note the vibrating screen near the top of the picture, installed to complete the separation of oversize stone

veyors are lowered to the desired position. This extension belt is driven by a chain drive that connects with sprockets on the head pulley of the reclaiming belt.

The boats can be loaded with this equipment at the rate of 600 to 1200 tons per hour, the rate of loading depending on the size of the rock being loaded. All of the rock the past season was shipped to Cleveland, Ohio, in five chartered boats, four of which are owned by the Valley Steamship Co., of Cleveland. The company, however, could ship to Canadian points, as the Canadian Pacific Railway serves the plant.

The boats are all of the self-unloader type, and four of them use the equipment



Vibrating screen beneath secondary revolving screen, with a chute for returning the oversize to the rolls

invented and developed by Leathem D. Smith, Sturgeon Bay, Wis. The fifth boat, the *Land Merchant,* uses a Sauerman scraper and a Webster elevator.

The boats of this type under charter, with their net cargo tonnages, are: *John McCartney-Kennedy,* 5000 tons; *S. B. Way,* 5200 tons; *Valley Camp,* 2600 tons; *Savage,* 6400 tons, and the *Land Merchant,* 2400 tons. All of these carriers unload at the rate of from 750 to 800 tons per hour.

Dominion Trap Rock Co. has contracts for 1,800,000 tons of crushed rock to be shipped during the next four seasons, and as production is increased, other contracts no doubt will be closed, for the company has several under advisement at this time. The company employs 100 men, all of whom live at Bruce, the company not having a boarding house or commissary.

Shops and Personnel

The present machine shop is of concrete-block construction, 40x80 ft., and it is planned to raise the roof of the shop high enough to permit running the locomotives, cars or shovels into the building for repairs during the winter

Stock piles and conveyors for piling the crushed rock at the Bruce Mines plant

months. The equipment in the shop consists of one engine lathe swinging 40 in. with 22-ft. bed, one engine lathe swings 20 in. with a 10-ft. bed, one 2x7-ft. bed planer, an 8-in. power hacksaw, a combination pipe and bolt threading machine, grinding wheels, a 4-ft. radial drill press, a 20-in. vertical drill press, and the usual blacksmith equipment. The shop machinery is driven by a 10-hp. General Electric motor.

The renovated plant was designed by the Traylor Engineering and Manufacturing Co., Allentown, Penn., and was erected by the company under the direction of P. E. Haworth, general manager. The fabricated steel was supplied by the Diester Construction Co., Toronto.

The operating officials of the Dominion Trap Rock Co. are: Perry E. Haworth, general manager; D. H. MacKay, quarry superintendent and mining engineer; Walter Turner, master mechanic and mill foreman; E. M. Haworth, in charge of pits and transportation; and C. T. Mackenzie, auditor.

Manufacturers Ask for Removal of Duty on Raw Mica

AT a recent hearing before the House Committee on Ways and Means, James F. Garneau, New York City, spoke for several companies interested in the manufacture of mica products. He said about 10,000 persons are employed in the manufacture of mica products, such as radio parts. The present minimum duty on raw mica is 4c. per lb., which he wanted eliminated.

The pair of loading structures at the harbor with the two movable loading conveyors raised to permit a ship to dock

Bechtel-Kaiser Rock Co. to Make Improvements

WITHIN the next 30 days a $30,000 improvement program will be started at the Bechtel-Kaiser Rock Co. plant west of

Chute carrying oversize from vibrating screen to the 30-in. conveyor that feeds the 54x24-in. rolls

Oroville, Calif., according to a recent announcement of W. A. Bechtel, head of the concern. The program will be completed 45 days after it is started. Speedy work is necessary in order to allow the crushing of rock ballast for the Western Pacific railroad tracks in the Feather river canyon, it is stated. Crushing of ballast will start in February.

Bids for the improvement work will be called shortly and the program, according to Mr. Bechtel, will include the installation of a washing plant, more screening for finer sized crushed rock and other crushing refinement features.

The output of crushed rock this year will be about 300,000 tons, it is estimated. Last year the output was 400,000 tons of rock. Sale of commercial rock will be more of a side issue with the Bechtel plant, it was stated. The principal object will be to crush ballast for the Western Pacific.

The plant was built last year and was operated through the spring, summer and fall months. Ray Kennedy will again be in charge of operations when the plant opens.—*Oroville* (Calif.) *Mercury-Register.*

The main part of the new Elkhart Sand and Gravel Co. plant at Glenbeulah, Wis.

A gasoline locomotive and side-dump cars are used in the pit. Chicago and North Western Ry. connection in background

The New Glenbeulah, Wis., Plant of the Elkhart Sand and Gravel Co.

Plant Opened in 1928 by the Moraine Gravel Co. Recently Acquired Elkhart Lake Concern

FOR A NUMBER OF YEARS the Moraine Gravel Co., of Plymouth, Wis., has owned and operated a sand and gravel plant at Glenbeulah, about five miles northwest of Plymouth. The company owned an extensive acreage of good quality gravel, and as the old plant was in need of extensive repairs, the company decided to build a new, modern plant in a slightly different location to provide for future expansion. The new plant was built during the past spring and was placed in operation in June. And now another change marks the development of this plant, as notice has just been received that the Elkhart Sand and Gravel Co. of Elkhart Lake, Wis., has purchased the Moraine company and all of its holdings. This deal, which became effective the first of February, will make the Elkhart company one of the largest producers of sand and stone in the state of Wisconsin. The addition of this new property will raise the total holdings of the new owners to approximately 1000 acres of gravel land.

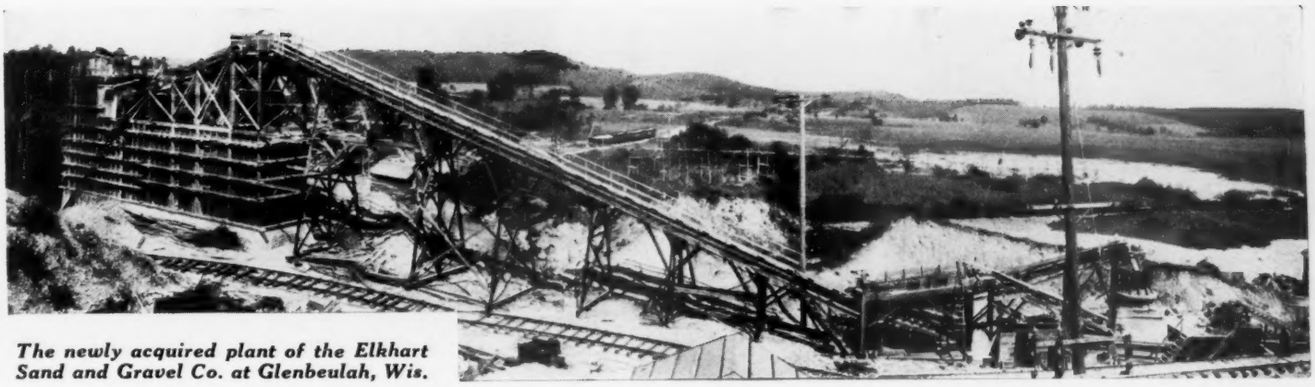
Some new and (to the Wisconsin industry) novel ideas were embodied in the design. The flow sheet, however, is nothing unusual except possibly in handling the sand.

All Material Goes Through Primary Crusher

Material as it comes from the pit runs heavy in stone up to 15 in. in size and in the proportion of 70% stone to 30% sand (average of last eight years' operation). For this reason it was determined to pass all material from the pit directly into and through the primary crusher. This scheme has proven very satisfactory after several months of operation.

A detailed description of the plant follows: Material in the pit is excavated by the use

The crushing and scalping screen equipment showing the 30-in. feeder at the right emptying into the primary crusher. The secondary crusher is shown just behind the primary crusher, straddling the conveyor to the scalping screen



The newly acquired plant of the Elkhart Sand and Gravel Co. at Glenbeulah, Wis.

of two shovels, one a No. 1 Thew electric with a ¾-yd. bucket, full swing, and the other a No. 2 Thew steam shovel. Both shovels are of standard-gage railroad type. Excavated material is loaded into a 6-yd. Western, side-dump car and hauled to the plant by an 8-ton Plymouth gasoline locomotive on standard-gage track. The cars dump directly over a bar grizzly set 12-in. centers,

Looking down the main conveyor toward the two crushers and the scalping screen, with the final pit face shown in the distance

into a hopper, the bottom of which is a 30-in. steel apron feeder with 8-in. sides. This feeder is driven steadily at a speed of about 50 ft. per min. and is inclined about 18 deg. from the horizontal, running over 30-ft. centers.

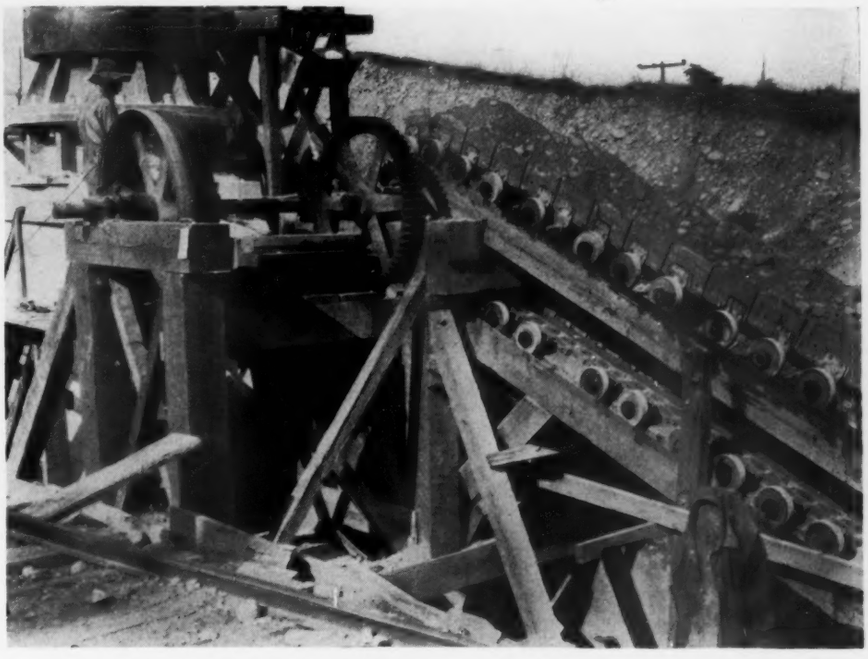
All material goes directly into a No. 6 Telsmith gyratory crusher, set for a 4-in. ring size product. Crushed material, including sand, is carried to a 40-in. by 15-ft. 6-in. Smith cylindrical scalping screen by a 26-in. belt conveyor running 250 ft. per min. on 53-ft. centers, 18 deg. incline. The scalping screen has 2½-in. perforations. Oversize material is returned by a 26-in. belt conveyor, 49 ft. 6 in. centers, slope 19 deg. 30 min., to a No. 4F Telsmith reduction crusher set for 1¼-in. ring size product. This material is then discharged directly from the secondary crusher on to the original belt conveyor running from the primary crusher to the scalping screen.

Sizing, Washing and Sand Recovery

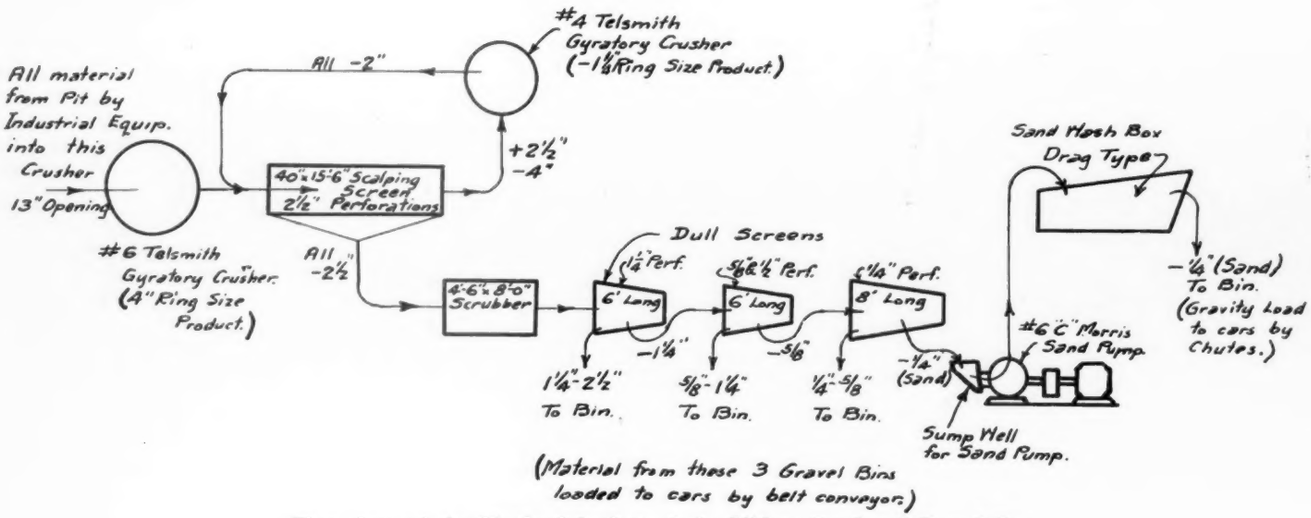
The secondary crusher foundations straddle this belt conveyor. Material sized minus 2½-in. from the scalping falls directly on to a 26-in. belt conveyor running 250 ft. per min. on 141-ft. centers and 20 deg. incline and is carried to a "V" head chute, which divides the flow into two banks of scrubber and screen sections.

The scrubbers are 4 ft. 6 in. by 8 ft., revolving cylinders of steel with baffle and lifting plates. From these scrubbers the material passes through three Dull, inclined, conical screens and is sized and passed by chutes into respective bins. Sand (minus ¼-in.) passing through the third Dull screen flows into a triangular 4-way, sloped, sump well, from which it is taken into a No. 6C

The 30-in. feeder from the track hopper delivering to the primary crusher



The apron feeder from the track hopper, set at an angle of 18 deg., delivers all of the pit material to the primary gyratory crusher. Note the 8-in. sides on the feeder to avoid spill


#4 Telsmith Gyratory Crusher (-1⅛" Ring Size Product.)
All material from Pit by Industrial Equip. into this Crusher
13" Opening
All -2"
40"x15'-6" Scalping Screen 2½" Perforations
+2½" -4"
#6 Telsmith Gyratory Crusher. (4" Ring Size Product.)
All -2½"
4'-6"x8'-0" Scrubber
Dull Screens
¼" Perf.
5/8" & ½" Perf.
5/16" Perf.
6' Long
6' Long
8' Long
-1¼"
-5/8"
-¼" (Sand)
1¼"-2½" To Bin.
⅝"-1¼" To Bin.
¼"-⅝" To Bin.
Sand Wash Box Drag Type
-¼" (Sand) To Bin. (Gravity Load to cars by Chutes.)
#6 C" Morris Sand Pump
Sump Well for Sand Pump.
(Material from these 3 Gravel Bins loaded to cars by belt conveyor.)

Flow sheet of the Glenbeulah plant of the Elkhart Sand and Gravel Co.

Morris sand pump and elevated against a 26-ft. head to a drag type, sand wash box. The finished sand is dropped from the wash box into its bin and the waste water is passed off to the dump, located several hundred feet from the plant.

Water is supplied by two American deep-well pumps, electrically driven at the rate of 1500 gal. per min., from a large spring-fed well, located about 150 ft. from the main plant.

Silent chain drive from 75-hp. motor to jack shaft driving the crusher, scalping screen and feeder

Grading Output

The markets supplied by this plant are now demanding several differently graded materials. Therefore, it was decided to try an innovation in the form of belt-loading the gravel from bins to cars. Accordingly, the plant bins are built with the long dimension at right angles to the loading track, instead of parallel thereto, as in ordinary practice. Bin gates feed directly on to a 26-in. belt conveyor running along the side of the bins, and any percentage gradation of coarse aggregate can be supplied by merely changing the gate openings.

The sand could not be belt-conveyor-loaded, so the Morris pump elevates this material to a sufficient bin height for gravity loading to cars by chute.

Power-Saving Features

Saving in power installation has been effected throughout the plant by various means. For instance, the primary crusher calls for 60 hp.; the secondary, for 40 hp.; the steel apron feeder, 8 hp.; one 53-ft. belt conveyor, 5 hp.; a total of 113 hp. This is handled by one 75-hp., 440-volt, 60-cycle, 3-phase slip ring motor connected to a jack shaft by a silent chain drive. Jack-shaft connection to the four units is made by belts.

The scalper and return belt to secondary crusher are run by sprocket-and-link, chain drives from the tail pulley of the long conveyor. Therefore, one motor drives these three units in addition to both banks of scrubber-screen sections. This is a 30-hp. electric motor.

The sand pump is directly connected to a 20-hp. motor. The sand-wash box is driven by a 10-hp. motor. The loading belt is being temporarily driven by a belt-connected 20-hp. motor.

Accessories

The bins are of timber construction resting directly on natural gravel base, which decreased construction costs.

An office building, oil supply house and machine shop comprise the balance of the

Another view of the scalping screen, with the secondary and primary crushers beyond, at the Glenbeulah plant

The two parallel banks of scrubber-screens at the recently acquired Glenleulah plant of Elkhart Sand and Gravel Co.

Gravel loading belt along the side

main plant. Cars on the loading track are handled by an ordinary hoist and cables as required.

The operation this year is rather handicapped by cleaning up portions of the deposit left from previous years. But when the main deposit is reached by the end of this season, the bank will be about 65 ft. high and of good length.

The construction for permanent operation of this plant involves the relocation of approximately ¼ mile of a county highway, the entire expense of which must be borne by the company.

Plans are under way for stock piling to take place probably next year.

The plant is located on the Chicago and Northwestern railway and is designed for a 25-car per 10-hour day capacity.

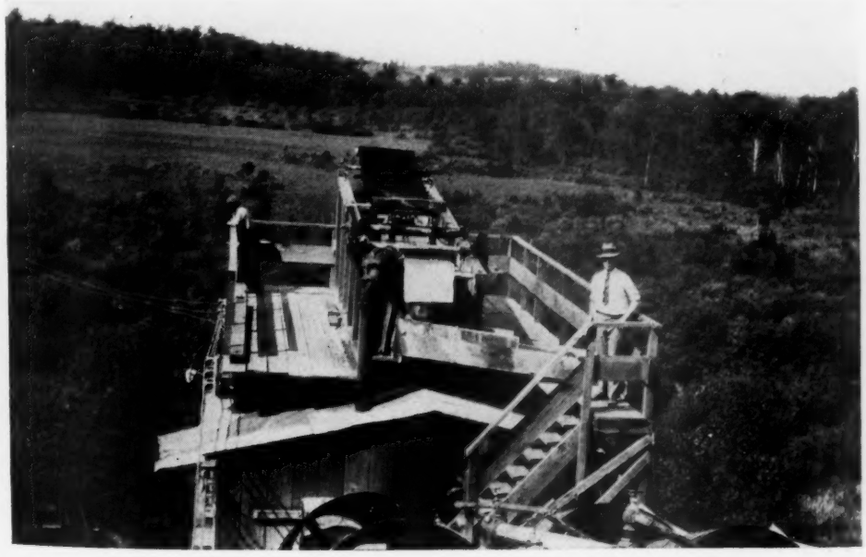
The Moraine Gravel Co. was owned jointly by Dr. C. R. Nutt and Mrs. A. W. Lee, both of Plymouth. A. A. Laun is president of the Elkhart company and Lester Laun is secretary-treasurer. The new plant was designed by Gordon F. Daggett, a civil engineer of Milwaukee, Wis.

Court Holds Owner Cannot Move Gravel from Mortgaged Property

IN A DECISION handed down recently at Fond Du Lac, Wis., County Judge A. E. Richter found that a mortgage holder was entitled to damages because the owner of the property on which the mortgage was taken had decreased the value of the premises below the face of the mortgage by removing gravel from the land. The decision was given in the case of D. H. Hendy vs. Jacob Krumm et al, which was heard in county court last October. In addition to the damage award, it contains two orders granting the plaintiff permanent injunctions restraining the defendants from removing any more gravel and from removing the residence on the premises.

Last year, Mr. Hendry, who owns the mortgage on the property, obtained a temporary injunction restraining W. R. Du Bois and Son, road contractors, from removing any more gravel from the Krumm farm. The court found that the contractors had removed 3,652.5 cu. yd. of gravel before the injunction was served and 292.75 cu. yd. afterwards under a contract of purchase with Krumm.

In his decision, Judge Richter held that the excavation for gravel has injured the premises and "constitutes an irreparable loss." He also found that the land had decreased in value and caused the plaintiff a loss of security on his mortgage of $1000 to $1500.



The sand washing box above the sand bin

Consolidated Sand and Gravel, Ltd., Merges with Paving Concern

ANNOUNCEMENT was made on January 27 by John Gleeson, president of Standard Paving Ltd., that the directors of his company and those of Consolidated Sand and Gravel, Ltd., of Toronto, at a meeting in Ottawa recently concluded negotiations for the merging of the two companies. It was stated that this will be brought about by the incorporation of a new company under the name of Standard Paving and Materials, Ltd., which will be capitalized at $6,000,000.

It was further stated that the transaction will involve an exchange of shares of the Standard Paving, Ltd., by giving 115 shares of stock in the new company for each 100 Standard Paving, Ltd., shares, and by giving the common shareholders of the Consolidated Sand and Gravel, Ltd., one common share in the new company for each two shares of their stock. It is the intention of the new company to extend its operations by the purchase of two or possibly three other companies and the method of financing these purchases has been arranged. The consolidation was arranged through J. F. M. Stewart of the firm of Stewart and Scully, Toronto.

Calaveras Cement Company's Recent Additions and Improvements

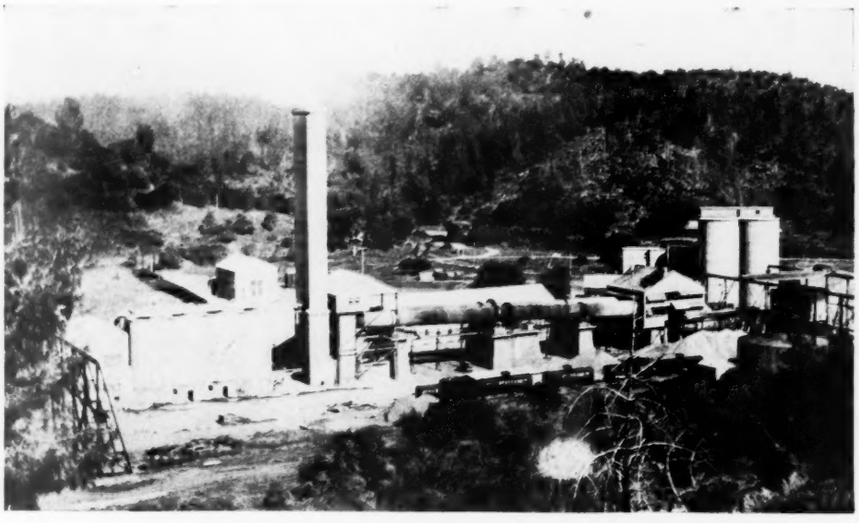
By James N. Hatch
Pasadena, Calif.

THE CALAVERAS CEMENT CO., whose plant at Calaveras, Calif., was described in ROCK PRODUCTS, January 22, 1927, has now been in operation for a little over two years and is already finding that its "first suit of clothes" is beginning to feel tight, owing to the growth of the company in length and breadth and thickness, and that a little letting out is required in a number of places to give that freedom of action that economical and efficient production requires.

To this end there has been purchased about 500 acres of land for a new quarry site on Old Gulch about five miles from the mill. It is proposed to open this up in the near future and to build a railroad from the mill. This new site is underlaid with a large deposit of what is known as sugar limestone or granular limestone, which tests almost pure calcium carbonate. It is proposed to operate the new quarry in connection with the present quarry, which is only about a mile from the mill. The rock from the new quarry will be used as a "sweetener" to be mixed with that from the present quarry.

To Operate New Quarry

In the present quarry, limestone and clay are obtained from the same quarry floor. In order to facilitate the production of the two materials in the proper proportion with the minimum shifting of quarry equipment, the company is now having a cut made through the hill approximately at right angles to the quarry face. This throughcut is planned to follow the division line between the high lime and the low lime in the ledge. When this is completed it will be possible to obtain high lime material from one side of the cut and low lime material from the other, so that the proper mixture of limestone and clay for sending to the mill can be more easily obtained without much shifting of equipment. This throughcut can also be worked in connection with other equipment on the regular quarry face, so that the proper material in the proper sequence can always be kept flowing to the mill.



General view of the Calaveras plant showing the enlarged storage yards and oil tanks in the foreground and the storage silos, which are to be duplicated, in the background

The extended clinker storage yard with the ends of the coolers shown discharging directly into the storage

So far, the work of the quarry has been done all on one level, a second bench will be cut into the hill about 50 ft. below the present floor and two benches worked back into the hill at the same time. The second bench will be reached by a switch from the railroad track which will branch off from the main track several hundred feet nearer the mill than the present switch.

Mill Additions

A number of additions to the facilities at the mill are also being made to increase capacity. The storage for crushed rock between the secondary crusher building and the raw mill, has been practically doubled in capacity by lengthening the crane runway. This storage is now 235 ft. long with

The present quarry floor and the beginning of the through cut

The guest house, known as "Kentucky House" in which many notable guests have been entertained

a capacity of 30,000 tons. The clinker storage, which is very similar to the crushed rock storage, and is located between the kiln building and the finish mill, and is served by a traveling crane, which is a duplicate of the crane over the crushed rock storage, has also been doubled in size, until it is now 213 ft. long with a capacity for storing clinker the equivalent of 75,000 bbl. of cement.

New Cement Silos

There is also now under construction an addition of four new cement storage silos adjoining the present four. The new ones are practically a duplicate of the present ones, being 32 ft. inside diameter and 80 ft. high, with star interstices. This will give the plant a storage capacity of 140,000 bbl. of cement. A new railroad side track has been added extending along past the silos, to better facilitate the loading out of cement.

A new Bates automatic tying machine has just been added which ties 2500 sacks per hour. The sacks are fed into this machine flat and the machine puckers the top and ties the sack with plain copper wire, which is fed through the machine from a reel.

The company now employs about 115 men at the plant, most of whom live in San Andraes or in the country near the plant. About 50% of the employes are salaried men and the labor conditions are most favorable and the labor turnover small. The output of the plant at the present time is about 3600 bbl. per day.

On of the most important contracts that is now being filled is the cement for the Pardee Dam near Lancha Plana, about ten miles from the plant. This dam is to form an impounding reservoir for the new water supply of the East Bay Municipal Utility District, to supply water to the cities of Oakland, Berkeley, Alameda, Piedmont, Emeryville, Albany, San Leandro, Richmend and El Cerrito. This work will require over 600,000 bbl. of cement.

Local Press Eulogizes the Late John C. Eden

JOHN CARMEN EDEN, president of the Superior Portland Cement Co. of Seattle, Wash., who died on January 12, is paid a deserved tribute by the local press of his home city, which notes:

"His death was one fight, the only one, he ever lost. There were so many others, fine ones, that won him and his adopted home, Seattle, fame and wealth, and carried with his winning fights wealth for a legion of his friends and associates.

"The outstanding success in the life of 'Jack' Eden was the Superior Portland Cement Co., of Seattle, which he organized in 1907 and of which he was president from its inception to the time of his death.

"Born in the town of Goderich, Province of Ontario, October 17, 1864, John Carmen Eden was of Irish-English parentage. Railway training in his native Canada fitted him for his early career. He came to Seattle in 1902 as traffic manager of the Great Northern railway. But his vision was broader. The iron and steel business had attracted him.

"Leaving here in 1906, he went to Chicago and, within a year, became president of one and director in another iron and steel company in Illinois, and president of a mines company in New York.

"That eastern experience was merely equipping Mr. Eden for greater corporation organization and management. He returned here in 1907 and organized the Superior Portland Cement Co. of Seattle and became president of this $7,000,000 corporation and its active manager. It made fortunes for its founder and for many associates.

"The principal plant of the cement company is at Concrete, Skagit county; it has a daily capacity of 6000 bbl.

"The hand of Jack Eden came to be seen eventually in many enterprises which have gone to build up the industrial strength of Seattle and the state of Washington. More and still more friends of this capitalist and indefatigable industrialist were brought into the Eden fold and enriched thereby, while the whole region felt the impetus of this increased employment of labor and shipping companies benefited correspondingly.

"One of his happiest achievements, as he often reflected, was his organization of the Bellingham coal mines. This meant an interlocking of the cement plant operation at Concrete and the coal mines at Bellingham, for in making cement, fuel is the chief item of expense in roasting the rocks for their cement product.

"While countless friends and many communities got the great good out of Jack Eden's activities, and will continue to do so, they or their estates, for years to come, yet it was denied the founder of these blessings to get out of it what his efforts entitled him to.

"'He gave up his health, his life, that others might live comfortably,' was the manner in which one sorrowing friend appraised this useful citizen when informed of Mr. Eden's death.

"On June 30, 1919, Mr. Eden married Caroline Sewall, in Chicago. She survives him. Their home, a magnificent structure at The Highlands, Seattle, ever has been one of the most hospitable in the whole country hereabouts.

"Mr. Eden was a member of the Masonic fraternity. His social and recreational associations were found in the Rainier, Arctic, Union, and Minnesota clubs and at the Seattle Golf Club. He was a director of the Portland Cement Association.

"Besides his wife, Caroline, Mr. Eden is survived by three sisters, Mrs. John Coulthurst, Bellingham; Mrs. Henry Lucas, Fort Worth, Tex.; Mrs. George E. Clark, Bridgeburg, Ontario, and by a nephew, E. P. Lucas of Bellingham."—*Seattle* (Wash.) *Times.*

Notes on the Determination of Free Lime in Portland Cement

By Harold H. Steinour and Hubert Woods
Department of Research and Development of the Riverside Cement Co., Riverside, Calif.

THE METHOD RECOMMENDED by Lerch and Bogue* for the determination of uncombined lime in portland cement and clinker consists in treating the sample, in a flask, with a glycerol-alcohol solution containing phenolphthalein indicator. The mixture is boiled; the lime dissolves, and is titrated at intervals with a standard alcoholic solution of ammonium acetate. When the pink color of the indicator fails to reappear upon further boiling, the titration is complete.

This method requires frequent titrations due to the rather moderate solubility of the lime. If an excess of acetate solution could be added initially, solution would be speeded up and back titration with alcoholic potassium hydroxide after a suitable period of boiling would complete the determination. Such a procedure would reduce both the time and the work now required. If, however, continued boiling causes the ammonium acetate to decompose or to react with constituents other than the free lime, the method is valueless.

The following experiments were designed to test these possibilities. One-gram portions of a clinker ground to a fineness such that 100% passed a 200-mesh sieve were employed. The determinations were considered to be complete only when an hour of boiling, following the final titration, failed to produce further color.

EXPERIMENT No. 1. Duplicate determinations were made in the usual way and 2.70 and 2.76 cc. of standard ammonium acetate solution were required.

EXPERIMENT No. 2. Two cc. of acetate solution were added initially. A total of 3.15 cc. were required.

EXPERIMENT No. 3. Five cc. of acetate solution were added initially. Back titration after 45 minutes, using alcoholic potassium hydroxide, showed that 4.79 cc. had reacted.

EXPERIMENT No. 4. A further experiment was performed in which no clinker was present in the glycerol-alcohol solution but 5 cc. of the acetate were added. After 45 minutes of boiling, back titration showed that none of it had reacted or decomposed.

The foregoing shows that the proposed change in procedure is not suitable, since the ammonium acetate, although it does not decompose spontaneously during a reasonable period of boiling, does react with some constituent or constituents of the clinker other than free or uncombined lime. Experiment No. 2 shows that this action is slow compared to the lime reaction and hence should not interfere with the determination as recommended by Lerch and Bogue* It is sufficiently great, however, to cause error if early titration in a check determination are greatly overrun for the purpose of speeding up the work.

If the ammonium acetate acts upon only one constituent other than free lime, it might be used for quantitative determination of that constituent. An investigation was started on this phase of the subject. It was found that the acetate reacted with a sample of tricalcium silicate but that the action was too slow to be of analytic value. Other compounds were not tried.

In all of these experiments reflex condensers were used to conserve the alcohol during boiling. The use of such condensers is an extension of the recommended procedure, which was early introduced at this laboratory, and which results in a considerable saving in alcohol when, as is frequently the case, the determination is of several hours' duration.

The reliability of the method was established by running determinations on identical samples both with and without a condenser. The results were found to check as closely as those of duplicate determinations run without condensers. Furthermore, the small deviations were both positive and negative, thus indicating no systematic error.

The error most likely to result from the confining action of the condenser would be the retention in solution of ammonia liberated by the titration. Hence, to confirm the results of the above experiments, strong ammonium hydroxide was added to glycerol-alcohol solution containing phenolphthalein indicator, which immediately turned red. The solution was then heated under a condenser and in a few minutes the color had disappeared completely, although the smell of ammonia over the liquid was very strong when the condenser was removed. From this it is evident that any increase in the effective pressure of ammonia vapor resulting from the use of a condenser is insufficient to hold appreciable ammonia in solution or to introduce error in the free lime determination.

Ind. and Engr. Chem., 18, 739 (1926).

Editor's Note

***SLIGHTLY** over a year ago the Riverside Cement Co. established a Department of Research and Development, having for its purpose, in addition to the investigation of the usual chemical and chemical engineering problems pertaining to the business of the company, the prosecution of fundamental research on the problem of quality of portland cement.*

This problem is being attacked from both physical and chemical standpoints.

On the physical side there is being made a thorough investigation of fine grinding in an endeavor to determine more accurately than has been done heretofore the laws governing reduction of size, and to formulate conditions under which optimum results are obtained.

On the chemical side there is being made a study of the effect of chemical composition of raw mix on the value of the resulting cement, and of some of the factors involved in the setting and hardening process.

The personnel of the research staff consists of eleven men as follows:

Hubert Woods, director of research.
Dr. Harold H. Steinour, physical chemist.
Howard Starke, mechanical engineer.
Dr. William N. Lacey, associate professor in charge of chemical engineering, California Institute of Technology.
Robert T. Knapp, instructor in mechanical engineering, California Institute of Technology.
Six research assistants.

Ford Motor Company Adds to Rock Products Totals

THE Ford Motor Co. added considerably to the country's total output of rock products during 1928 through the production of two by-products of its River Rouge plant. The slag from the great blast furnaces at the plant totaled 283,210 tons. This was used largely for the production of cement at the company's plant though some was used for aggregate and for the construction of roads. The cement plant turned out a total of 620,075 bbl. of portland cement during 1928.

Changing the Properties of Portland Cement by Artificial Admixtures

Long Island Experimental Plant Operating Under Kraus Patents

IN AN ARTICLE in Rock Products, September 5, 1925, was described "the Kraus method of making quick-setting lime plaster," the basis of which is the processing of clay and silica to put them in colloidal form. C. E. Kraus, of the Kraus Research Laboratories, New York City, is the originator of the process, which at that time was directed more particularly toward solving the problem of quick-setting lime plaster. In the course of his work, however, Mr. Kraus discovered that he could combine his treated clay and silica with limestone to form portland cement clinker much more readily than the usual raw materials. Out of this his attention was subsequently directed toward the possibility of making a "corrective" or admixture which would give standard portland cement some of the desirable qualities at present in demand, such as high early strength and plasticity.

In view of the great current interest in this subject, and the firm belief on the part of many cement manufacturers that an admixture or catalyst may be found to do the trick, it is desirable to bring Mr. Kraus' work to date.

During the year a company has been founded known as "Kraus Process, Incorporated," to take over the Kraus patents for the purpose of developing the process commercially. The following data was furnished by J. C. Cheney, president of the company:

"We built a small demonstration plant in Long Island City and although it is not a balanced manufacturing unit, we can manufacture approximately three tons per day. The primary object in having this plant was to prove the process to be commercial and also to experiment and decide upon the best type of equipment from an economical point of view.

"The process is working most satisfactorily from every point of view and we are able to produce a material more uniform and at a lower cost per ton of raw materials than we had originally anticipated.

"We will outline briefly the three products on which most of the attention has been centered during the past year.

"Hydrofrax is a high temperature cement to be used to cast or mold ovens, furnaces, etc., replacing the 'built-up' construction type. It withstands disintegration under continued high temperatures.

"*Lime Products*—The product that we have perfected this year is our quick-setting, rough coat plaster which is used as the scratch and brown coat in all plastering work. As we stated before, the method of manufacture has been perfected and we have manufactured large quantities of plaster for different clients using their own raw materials. In this way we have demonstrated to their satisfaction that a quick-setting lime plaster with high sand carrying capacity can be made by the Kraus process.

"The process is very elastic in the quality as well as quantity of oxide and carbonate used and there is therefore a wide cost range possible. The manufacturing procedure is quite automatic so that the labor is reduced to a minimum.

"Aside from retaining all the advantages of the old time lime putty plaster we have given it the quick-setting qualities which is a present day requirement, namely, scratch coat must set in eight hours to enable the second coat to be applied the second day. We have not only maintained the high sand carrying capacity of the old lime plaster, but from present indications we have slightly increased that, so that we feel safe in stating that our plaster on the average job will carry from 30% to 50% more sand.

"Among the important characteristics of

REPORTING OUR EXPERIMENTS ON THE "KRAUS CORRECTIVE"

We received three sacks marked PLC-3296, 4141 and 4202. Subject to their instruction, the material was tested by mixing 20 parts of the "corrective" with 80 parts of the finished cement. Chemical and physical tests were made with the following results:

Analysis	LPC-3296	LPC-4141	LPC-4202	Cement used
Silica (SiO_2)	33.02	19.82	24.48	21.72
Ferric oxide (Fe_2O_3)	0.58	1.17	1.03	2.44
Alumina (Al_2O_3)	30.44	18.91	24.29	6.30
Lime (CaO)	15.93	30.41	18.86	65.40
Magnesia (MgO)	0.80	3.69	10.21	1.80
Sulphur anhydride (SO_3)	5.35	10.08	7.55	1.41
Ignition loss	16.60	17.70	15.85	0.60

PHYSICAL TESTS WITH 80 PARTS OF THE ABOVE CEMENT AND 20 PARTS OF EACH "CORRECTIVE"

Setting time	Cement	Plus LPC-3296	Plus LPC-4141	Plus PLC-4202
Initial	1 hr. 40 min.	3 hr. 15 min.	1 hr. 10 min.	2 hr. 50 min.
Final	3 hr. 20 min.	4 hr. 50 min.	3 hr. 50 min.	4 hr. 25 min.
Minus 200-mesh	90.0%	88.4%	89.4%	88.4%
Specific gravity	3.15	2.97	2.98	2.99
Normal consistency	23.0	35.3	36.5	35.8
TENSILE STRENGTHS:				
1-day neat	530	348	322	335
2-day neat	710	487	403	395
3-day neat	727	560	500	462
7-day neat	742	585	498	488
28-day neat	778	562	463	457
1-day 3:1 sand	200	217	217	245
2-day 3:1 sand	237	278	285	343
3-day 3:1 sand	270	292	313	335
7-day 3:1 sand	355	428	387	427
28-day 3:1 sand	413	493	487	530
COMPRESSION STRENGTHS:				
3-day 1:3 sand	1433	1514	1433	1672
7-day 1:3 sand	2149	2627	3025	2749
28-day 1:3 sand	2927	3344	3742	3500
PERMEABILITY:				
Grams of water forced through a 1-in. thick 1:3 mortar in 48 hr. by 40 lb. per sq. in. pressure....	6.785	2.3082	1.9570	2.1282

(Above results are mean of six specimens.)

This mixture of either "corrective" with the cement makes the most plastic mortar that we have ever tested in this laboratory.

Note the normal consistency of each. As you know, this is determined by the Vicat needle and is the amount of water required to obtain a specified consistency; hence the more water used to bring a material to this consistency, the more plastic that material is. If we take a plasticity of 100 on our cement (N.C. 23.0), then the plasticity of the corrective mixture would be No. 3296-153, No. 4141-159 and No. 4202-156. A well-known plastic cement on a similar rating would have a plasticity of 122 and our plastic 113. Note also the specific gravities of the mixtures compared with straight cement.

This cement with these admixtures would have a very high sand-carrying capacity with none of the objectionable features of the "grease" plastics. Any cement made plastic by the use of oil or greases (stearates, etc.) are water-repellant and are very difficult to mix by hand. They also decrease the strength of the resultant concrete.

In the above strengths you will note the neat strengths are all lower, as is to be expected, and found on all the plastic cements. However, in all cases the 3:1 mortar strengths are higher, although much more water is required in the making. This material is a mixture of hydrated lime, colloidal clay and gypsum, and has some hydraulic properties in itself. In the permeability tests it only shows up fair; is better than the plastic cement referred to, but not as good as our diatomaceous earth admixture cements.

SUMMARY—These admixtures make a very plastic cement, do not decrease the strengths, are easy to mix with water, have very high sand-carrying capacities, and tend toward a waterproof concrete.

Looking over the three, I would prefer using No. 4202, as it gives increased strengths with a retarded set.

this plaster is its ability to withstand the action of water, such as dampness. Even when submerged it does not disintegrate. This material not being hygroscopic, it absorbs little or no moisture. Therefore it will keep in storage.

"As the result of our demonstration work we have convinced several of the large lime manufacturers that our product is commercial and we are now negotiating licenses for different territories. We anticipate that it will only be a comparatively short time before the product is on the market.

"In your article that appeared on September 5, 1925, you gave the comparison of certain qualities of gypsum, lime and Kraus plaster. The results shown have been verified and slightly improved by us in the product, particularly in the sand carrying capacity.

"*Cement Corrective*—We contemplate calling our new corrective or a mixture of the corrective with portland cement 'Suark.' This word will be made up in a special design and registered as a trademark and patented, and we contemplate referring to the product as 'Suark cement.'

"We are not able to give you a long duration test on these particular 'correctives' as tested by one of the portland cement companies, but we are sending laboratory reports, but from other tests covering 365 days on other cements, and we think that the advantages that we have shown in strength during the first 28 days have been maintained or increased through the 365 days.

"There is one other form of deterioration. A cement weakens through aging. We have found and shown by tests that a mixture of our 'corrective' with portland cement tends to prevent this deterioration. We have taken cements that were six and nine months old and testing them with the addition of our 'corrective' they were brought back to nearly their normal strength. Also the mixture in storage for a month does not get hard as does portland cement.

"In referring to these data you will note that several different 'corrective' numbers appear. We have found that in order to be most effective that we must balance the 'corrective' to the individual cement that we are studying. The ratio of lime and clay in our product must be varied to balance the analysis of the cement.

"In referring to these data you will find in some instances 10% of our 'corrective' gives very gratifying results, while in other cases 20% is needed. We have found that 20% of our 'corrective' on an average gives the best results.

"The cement companies which are considering the use of this process contemplate selling this as a complete mix in a bag under a special name.

"A very extensive series of tests is being conducted in several of the large cement consuming industries. We have found the consumers to be in a most receptive frame of mind when we could offer them a 'corrective' to use with their cement which would give them the properties imparted by our 'corrective.'

"Additional investigation and experimental work is being conducted by cement companies in Japan, Sweden and Belgium."

The laboratory data referred to from one of the cement companies which has experimented with the 'corrective,' is shown in the table on the preceding page.

Money Paid Into Employes' Insurance Fund Not Deductible from Income

Employes' Insurance Fund Subject to Income Tax

IN THE PROCEEDINGS of Spring Canyon Coal Co. v. Commissioner of Internal Revenue [Docket Nos. 23902, 25743, Board of Appeals], the question to be decided was whether the taxpayer was entitled to deduct amounts paid by it into a welfare or compensation fund for its employes.

The petitioner has been engaged in the mining of coal in Utah since 1912 and in 1919 elected to become a self-insurer and made application to the State Industrial Commission for permission to carry on compensation on that basis, and the application was approved after a bond of $50,000 had been posted.

The compensation laws of the State of Utah provide that all employers are required to secure compensation to their employes by one of three days: (1) By payment to the state insurance fund; (2) by payment to a duly authorized insurance company, and (3) by furnishing annual proof to the commission of ability to pay direct. At the discretion of the commission a bond in this last case may be necessary.

The petitioner established a compensation insurance fund, together with two other coal companies, and employed one F. D. Brown to take charge of the administrative duties in connection with the handling of said monies. Brown organized a system for carrying out the program, keeping the funds from the three companies in separate and distinct accounts. This system called for a monthly examination of the payroll accounts of the coal producers, and the amount each was to pay to the separate funds was determined and monies thus received were deposited at a bank to the "Welfare Funds" credit and was used only for satisfying compensation and personal injury claims.

In the balance sheet of the petitioner for the years under consideration, the balance remaining in the fund has been reflected as an asset and a corresponding amount reflected as a reserve for workmen's insurance and therefore not included in the surplus on the books of the petitioner, nor has said fund been claimed in any part by the petitioner as invested capital for the years in question.

The Welfare fund, together with all additions, has been included by the respondent as part of the petitioner's invested capital. After making all payments of compensation, together with necessary administrative expenses, the net additions made by the petitioner amounted to $30,407.97 for 1920, $28,365.67 for 1921, and $12,130.26 for 1922.

Claims That Amounts Constitute Trust Fund

In determining the amount of net income subject to taxation for these years, the petitioner deducted as necessary and ordinary expenses the above amounts, and the respondent refused to allow these deductions in determining the deficiency taxes.

The petitioner contends that the amounts set aside constituted a trust fund and that payments thereto represent ordinary and necessary expenses incurred in its business; that the continuing payments to said fund being required by law are deductible as ordinary and necessary expenses in the computation of net taxable income, and that it is an *insurance company* for the purpose of paying workmen's compensation insurance and is entitled to deduct additions to the fund, as a reserve required by law; in the computation of its net taxable income.

The respondent, on the other hand, contends that there is no authority under the revenue acts for such deductions as are contended for by the petitioner; that the amounts set aside by the petitioner

are not "required by law to be made within the taxable year to reserve funds;" that the amounts sought to be deducted are now allowable as ordinary and necessary expenses under the provision of Section 234 (a) (1) of the Revenue Acts of 1918 and 1921; and, furthermore, that the fund so set aside, as required by resolution of the Industrial Commission of Utah, is not a trust fund and the net additions thereto are not deductible as ordinary and necessary expenses in the computation of net taxable income.

The respondent cited previous decisions on questions of deduction, among which were: Pan-American Hide Co., 1 B. T. A. 1249, where here the taxpayer assumed certain risks itself as an insurance carrier and charged to its profits amounts equal to the premiums that would ordinarily go to the insurance company, and deducted those amounts in computing its net taxable income. The board here in the case did not sanction a deduction.

In L. A. Thompson's Scenic Railway, 2 B. T. A. 664, owing to extreme fire hazard no insurance company would accept the risk, so the taxpayer set aside, out of its income, amounts representing the premium they would have been obliged to have paid if an insurance company had taken the business. The board here said in part, "The amount of the reserve does not constitute an ordinary and necessary business expense and therefore is not deductible."

Petitioner Claims Case Is Governed by One Decision

The petitioner contends, that its case is not controlled by the above cases but is controlled entirely by the decision in Hibbard, Spencer, Bartlett and Co., 5 B. T. A. 464. In that case the taxpayer submitted to its employes a proposition for the establishment of a pension fund, which was accepted by the employes and the taxpayers, and a fund known as "Hibbard, Spencer, Bartlett and Co. Pension Fund" was created. Rules and regulations were promulgated, governing the operation of said pension fund, in which it was provided that a committee of seven be created, consisting of the president and vice-president of the taxpayer, three directors thereof, and two employees; that each employe specified in those regulations should contribute to the said fund a sum equal to 2% of this annual salary, not exceeding $60 per annumn, to be deducted quarterly from the payment of such salary, and that the taxpayer should contribute each quarter a sum equal to the aggregate payments by the employes during the same period.

The taxpayer there contended that there was a valid trust relationship created between itself and its employes, and that it was thereafter a separate taxable entity, and payments made to it were deductible in the computation of net income as ordinary and necessary expenses of carrying on its business.. The board there, after having concluded from the facts and circumstances that there was a valid trust, held that the payments made by the taxpayer to the fund were ordinary and necessary expenses of conducting its business.

There is no evidence in the instant case, as there was in that case, of an agreement between the petitioner and its employes, looking toward to the establishment of a trust fund, nor can we find from the act of the petitioner in establishing the said fund that there was any intent to create a trust of the amount set aside pursuant to the order of the Industrial Commission of Utah. If a trust was established it must have been by the voluntary action of the petitioner. The only thing required by the Industrial Commission was that a reserve be set aside.

Find No Separation of Legal and Equitable Estate

While the funds created in both Hibbard, Spencer, Bartlett and Co. and the instant case are for the benefit of a class, it is important to note that here the cestui who is to benefit by the fund is unknown, and unidentified, and can assert no claim until he has been injured in some manner provided for in the workmen's compensation act. In the Hibbard, Spencer, Bartlett and Co. case, however, the cestui is definitely ascertained and identified as and when contributions are jointly made to the fund by the employer and employe. The obligation in one case arises upon the employe depositing a certain amount in the fund within a given year, whereas the obligation of the petitioner in the instant case to pay sums to its employes may never arise.

Considering all the facts and circumstances, we are of the opinion that the amounts in controversy were not paid to a trust fund and that the instant case is not controlled by the doctrine of Hibbard, Spencer, Bartlett and Co. supra.

The fact that the state statute permits it to insure its own workmen, in lieu of placing the risk with insurance companies regularly engaged in that business, does not convert a coal-mining business into an insurance business. Nor does the fact that it was compelled by section 3125 of the Compiled Laws of Utah to pay a tax "of the same per cent as required by law to be paid by insurance companies upon their premiums" change the character of the petitioner's business from coal mining to insurance.

Therefore, considering the state statute in the light of McCoach v. Insurance Co. of North America, supra, and United States v. Boston Insurance Co., supra, we are of the opinion that the amounts sought to be deducted by the petitioner are not reserve funds "required by law" within the meaning of the taxing statute.

Increase in Tariff on Sodium Phosphate Discussed

REPRESENTATIVES of both the foreign and domestic sodium phosphate industry have concluded their testimony before the tariff commission in the investigation covering the cost of production. Accordingly, the chairman of the commission, Thomas O. Marvin, set Monday, February 11, for the filing of briefs.

An increase of a quarter of a cent per pound on imported sodium phosphates would exclude the Belgian producers from the American markets, although they would continue to purchase their raw materials from Florida, E. Hennion Courtois, Belgian producer, testified. Mr. Courtois was the last witness called by his counsel, Herbert M. Wallace, of New York City. Mr. Courtois spoke in opposition to an application of the Warner Chemical Co. for higher tariff in order to equalize the costs of production in this country and abroad for sodium phosphates.

The prices for phosphate rock, the base for manufacturing sodium phosphates, are the same in this country as abroad. Mr. Courtois declared that he used a little more than 50% of the American raw material. He declared that the cost of the rock at the mines has been the same since 1926, although there has been some increase in the cost to him because of ocean and inland freight rates. He said he paid $8.32 per metric ton for French Tunis rock and $10.40 for the Florida rock, the prices including deliveries at his plant.

Oklahoma Gravel Pits Yield Prehistoric Relics

FOSSIL REMAINS tending to show man lived in Oklahoma thousands of years ago continue to be exhumed from the Holloman gravel bed, near Frederick, Okla.

Specimens of at least 16 different animals and 11 articles have been uncovered there within the last year, says Dr. Charles N. Gould, director of the Oklahoma geological survey.

Three extinct horses, two species of now extinct ground sloths, one tapir, one glyptodon, one peccary, or wild hog; one llama, one camel, two mastadons, three elephants, and one soft-shelled turtle have been found.

Human implements reported taken from the gravel beds include seven metates, or grinding stones; three arrowheads, and one bead. The bead and two of the grinding stones are lost, but the other articles are being preserved.

Gould points out many authorities accept the Frederick discoveries as pointing to the conclusion that man has lived in America much longer than previously had been believed.—*Oklahoma City* (Okla.) *Times.*

Opportunities for Using Indicating and Recording Control Instruments in Our Rock Products Industries

Part II.—The Part of Instrumentation in Industry in General

By James R. Withrow
Head of the Chemical Engineering Department, the Ohio State University

THE IDEA that instrumentation should be of greater help to the rock products industries than it appears to have been would be greatly strengthened if it should develop to be evident that instrumentation has actually been a significant factor in other industries.

Temperature measurement is the most highly developed and most widespread form of instrumentation. Instrumentation in one form or another has been a significant factor in the development of our rock product industries. The use of instruments in the actual manufacturing operations in this group of industries is by no means general, however. There is no doubt of real backwardness in many cases. There is also no doubt that instrumentation has its limitations in manufacture and particularly in our industries. Installation has certainly been overdone in particular cases. These will be taken up later. In the meanwhile it will be well to survey some results of instrumentation in industry in general. We should thereby get a glimpse of the spirit and value of instrumentation as well as its achievements. The great strides of modern industry therefore should first be taken up in relation to instrumentation.

Instrumentation in Modern Industry

The great strides in industrial development of the last century were but a prelude to the enormous rapidity in the development in the first years of this century. Each decade and even each year brings astonishing developments. Every one is so familiar with the great strides of industry nowadays that no one seems surprised at any development and few bother to inquire just what detail has been the key to the successful solution of problems or advances. We older people always look up when we hear the hum of a plane, but our children pay no more attention than they do to a safely distant bumble bee, modern advances are so common and to be expected in their eyes. He who has been through his own grief in industry, and has hacked at his own problems, is a little better tuned to sympathize with the troubles in other plants or industries and is at any rate keenly interested in new developments, for he realizes that one can never tell when improvement in one industry may mean complete readjustment if not improvement in related industries. The general advance in industry by no means shows, however, in all industries alike.

A mere mention of some of our great industries calls to mind the extent of modern industrial development. Reference to the

Dr. James R. Withrow

table of summarized industries from the latest manufacturing census gives a partial picture of the magnitude of manufacturing industry, leaving out the well known status of agriculture, mining, quarrying, transportation and the like. The great strides of most of these industries are well within the memory of all of us.

MANUFACTURING INDUSTRIES

Industry	Value of Products	Number of Establishments
1. Wearing apparel	$5,499,854,690	20,830
2. Automobile industry	4,721,000,000	1,655
3. Iron and steel	3,711,354,460	595
4. Slaughtering and meat packing	3,050,286,291	1,269
5. Printing and publishing and related industries	2,482,065,950	22,725
6. Petroleum refining	2,376,656,556	359
7. The principal lumber industries	2,284,317,682	14,792

MANUFACTURING INDUSTRIES
(Continued)

Industry	Value of Products	Number of Establishments
8. Machinery	2,232,985,974	8,154
9. Leather	1,767,581,000	4,264
10. Electrical machinery apparatus and supplies	1,540,002,041	1,739
11. Railroad repair shops	1,332,679,079	2,363
12. Flour, feed and other grain mill products	1,298,014,788	4,413
13. Bread and other bakery products	1,268,194,507	17,684
14. Rubber	1,255,414,112	498
15. Wool manufacturing	1,199,417,490	973
16. Smelting and refining	1,067,124,899	71
17. Butter, cheese and condensed and evaporated milk	973,518,046	6,830
18. Paper and wood pulp	971,882,320	763
19. Furniture	868,145,913	3,235
20. Knit goods	809,960,213	1 987
21. Sugar industries	752,406,794	204
22. Canning and preserving	677,131,278	2,722
23. Manufacturers of nonferrous metals and alloys (except precious metals)	675,693,063	1,242
24. Miscellaneous food products	649,236,979	1,412
25. Chemicals	582,808,369	797
26. Stoves, ranges, domestic heating apparatus and steam fittings	493,232,937	789
27. The drug industry	472,494,323	2,243
28. Paints and varnish	470,736,264	923
29. Steam and electric railroad cars	390,771,210	141
30. Gas and coke industry	378,633,527	237
31. Power laundries, dyeing and cleaning establishments	362,294,749	4,859
32. Cement	300,895,070	145
33. Glass and mirrors	295,959,424	310
34. Soap industry	278,273,107	272
35. Beverages	237,760,741	4,210
36. Musical instruments and phonographs	231,687,000	461
37. Fertilizers	206,772,904	587
38. Manufactured ice	186,969,036	3,077
39. Ship and boat building	177,181,960	565
40. Miscellaneous fiber and textile goods	139,121,616	159
41. Flavoring extracts / Flavoring syrups	94,211,934	431
42. Rayon (primary)	88,060,000	14
43. Clocks, watches and parts	81,789,729	128
44. Explosives	69,668,837	103
45. Lime	50,736,499	283
46. Ammunition and related products	43,569,543	27
47. Turpentine and rosin	42,364,413	1,007
48. Tanning materials, dyestuffs, mordants and sizes	34,783,703	125
49. Buttons	32,458,435	289
50. Children's carriages and sleds	30,173,501	86
51. Carriages, wagons, sleighs, sleds and materials	30,052,430	233
52. Wood distillation and charcoal manufacture	25,283,432	106
53. Motorcycles, bicycles and parts	24,257,923	36
54. Malt	24,069,238	23
55. Needles, pins, hooks and eyes, snap fasteners	18,173,574	48
56. Firearms	15,179,363	20
57. Bone black, carbon black and gas black	14,564,982	66
58. Fireworks	6,031,435	41

Industry Without Instrumentation

If one does not observe closely he will

readily get the idea that much of modern industry is entirely without instrumentation or instrumental control of any kind. These appearances are very deceptive, though some industries can be operated entirely without any instrumental control whatever.

It will be evident at once, on reference to the table, that at least 15 or 20 of the great industries mentioned would probably operate entirely without any instrumentation whatever. One would not expect instrumentation at all, for instance, in printing, lumber, machinery, leather, furniture, stoves, cement, musical instruments, fertilizers, clocks, lime, turpentine, buttons, carriages, etc., motorcycles, needles, fireworks and perhaps others. Those industries in this group which have to do essentially with the making of a single product, and have little or no variation as to quality in any given plant (although many plants in these industries operate with no instrumentation whatever), as in the making of leather, cement, glass, fertilizers, lime and turpentine, frequently standardize manufacture to such an extent that instrumentation is feasible in some plants, which consequently never operate without it.

The great group of this list of doubtful users of instrumentation are makers of miscellaneous products. In practically every plant of these kinds, however, such as in printing, lumber, machinery, furniture, stoves and the like, even here, instrumentation is utilized to a surprising extent as one discovers when one becomes familiar with the industry itself. For instance, it is quite common to see recording pyrometers in stove factories, where great care must be taken in getting decorative effects by proper regulation of temperature when enameled stoves or parts are manufactured. Similar unsuspected cases arise in practically all industries.

Probably the great bulk of industries have developed, in the past, through a pressing demand for a product which had to be met and which could not await the refinements or economies to be secured essentially by instrumentation. Most of us can remember the old steam boiler plant with few or no instruments. Even these could not be operated without a water gage and usually a pressure gage. Many other illustrations could be given for much still seems to be done without instruments, as in the case of most shaft, lime kilns. However in most cases this merely means someone else by good management did our instrumentation, though this would not be the case with lime kilns.

It even must be admitted, for instance, that there would be no trouble about using electric current without the use of measuring instruments, provided only, however, that our source of current was either of very low voltage or made fool-proof as to its strength by some one possessing the means of measurement of instrumentation before the device is turned over to us for operation. Any one can buy a few dry cells, or otherwise rejuvenate his home radio set, but woe betide him if he hooks up an unknown source of current or hooks his various batteries improperly to the set without testing their voltage by instruments before the hook-up. Such a one merely courts disaster and sooner or later replaces expensive parts of his outfit. One lesson like this is usually enough.

Instrumentation Development

The first instruments may have been toys. At any rate they early became weapons. At first weapons of defense—they became tools of production in the chase, in the seige, and finally developed into machines and engineering equipment. Always the manufacturing problems demanded new instrumentation. Development in industry has been so great that few manufacturing ventures can compete without that precise control which can result alone from instrumentation.

The advances in machine shop practice in this generation are beyond belief. The instruments of the modern machine shop can almost think. The mechanic has had his brains extended by instrument development until he does without an effort what the physicist of a generation ago found practically impossible in the most precise laboratory measurements.

Rarely does a new manufacture initiate today without instrument control. Even the machine tender in the shop tests his product by measurement to half a ten thousandth of an inch in the ordinary run of much machine shop routine production. This is a degree of precision utterly beyond human vision without the marvelous instruments of precision in the modern shop.

Even the household today and the physician are increasingly dependent on instrument measurement. Thermostat control of fuel in our kitchens and household heating is a well known household economy. This alone accounts for much satisfactory advance in household comfort today.

Instrumentation and Industry

There is nothing more difficult than to put one's finger upon the particular reasons for any great advance in industry. The writer used to amuse himself in attempting to place the blame for the success of high explosive manufacture (used by our rock product and other industries) upon some one chemical element, such as nitrogen. It is usually stated by chemists that nitrogen is the basis of all high explosives. This is not exactly a fact, but the great bulk of our high explosives are certainly nitrogen compounds. If we confine ourselves to the high explosives from coal tar and similar carbon derivatives —the great bulk of such high explosives—we see that they are carbon and hydrogen derivatives, also. The explosion of hydrocarbons (gasoline) in our motors give us automotive power. Air (or oxygen however, as in most high explosives) is a vital necessity for chemical explosion. The oxygen in the case of the explosive is hooked on by the nitrogen, which is its function. This nitrogen cannot be hooked to the glycerine or toluene for dynamite or T. N. T. without the aid of sulphur as sulphuric acid. Neither the nitric acid or sulphuric acid for explosive production can be made without many other materials and metals, such as lead, iron, stoneware and the like. Pinning the medal upon nitrogen as the key element is not the whole story therefore, though nitrogen really is the key if there be such.

If one should in a similar way ask himself *what one thing has been responsible for the great strides in modern industry*, he would surely have to reply, *"measurement and instrumentation."* Here again many qualifications immediately come to mind. When we are all through with them, however, it must be admitted that without instrumentation, few if any, of our great strides in modern industry could have been attained. Certainly our present development would not be maintained without instrumentation.

Herbert Hoover has frequently called attention to the fact that this is the age of engineering. Engineering enters into all phases of production, manufacturing and industrial development as well as the whole fabric of living in our civilization. Engineering itself goes into the ultimate details of every question concerned with the utilization of natural phenomena and materials if and when necessary to guarantee performance. In doing these things minutely in either investigation or guaranteeing performance, the most important tool in the last two decades in the hands of engineering has been *measuring, indicating, recording* and *control instruments* or devices. These instruments have become so highly developed that in the laboratory it is no great trick to measure within a billionth of an inch, and in everyday life to build a tunnel from two ends, or a bridge across Niagara Gorge so that the two portions even of the bridge weighing hundreds of tons may meet within a fraction of an inch. Obviously only by the use of instruments are such things possible.

The great strides of modern ocean navigation have been made possible by indicating and control instruments. Both the engineer down in the hold, and the captain on the bridge have before their eyes, a series of indicating and control instruments, telling them not only the power available, but the speed of equipment, the directions of turning, and other essential facts. On a war vessel, this whole system becomes highly complicated, so many more delicate and essential elements in high speed naval warfare appear for whose success dependence must not be made on human workers. The approach of the vicinity of icebergs; the approach of submarines or torpedoes; the

approach of land, or of other vessels, are all told by indicating devices.

The necessity of indicating, recording and control instruments in modern new engineering equipment is well illustrated by the instruments in use on high-powered automobiles and in aviation. Everyone remembers the pictures of the instrument board in front of Lindbergh, without which it would have been utterly impossible for him to have succeeded in his achievement.

A striking illustration of the way a mere instrument single-handed may enable a big engineering project to take not only a great stride forward but maybe the single necessary element of success, is the case of Lord Kelvin's work for submarine telegraphy, a practical problem solved by instrumentation. The first Atlantic cable was laid about 1858, but scarcely had the enthusiasm awakened by it begun to subside when the signals grew more and more feeble and in a few weeks the cable altogether ceased to transmit messages. The invention of the instrument known as the siphon-recorder by Lord Kelvin thereupon, developed to register the electric impulses transmitted by the cable, still remains in universal use a standard instrument in submarine telegraphy. As a result a new cable was designed, also better adapted than previous kinds to bear the strain of laying, and in 1865 this cable had established permanent telegraphic communication between England and America.

Some branches of the chemical industry never prospered until engineers had developed methods of temperature control and regulation. For instance at the beginning of the last century when Napoleon started the La Blanc soda ash industry in Europe, there were two general proposals the fundamental chemistry of which had been developed and were well known. One of these was what is known as the La Blanc process. The other was what is known now as the ammonia soda process. The La Blanc process was adopted and successful and the ammonia soda process was rejected, because engineers had not yet acquired skill in the handling of large quantities of gases without loss. Such gases as ammonia and carbon dioxide were rather expensive. Engineers had also not acquired skill in the control of temperatures within narrow limits in manufacturing processes. This latter was necessary so that the water soluble bicarbonate of soda would be precipitated in, and therefore readily separable from, the water solution of salts from which the bicarbonate was to be manufactured. To precipitate or throw out of solution a water soluble salt without changing it first into another chemical substance is an unexpected result, which can sometimes be readily accomplished by a delicate control of temperature. Ability to so control temperatures was unknown to the engineering profession of that day.

Not until fifty years later did the Belgian engineer, Ernest Solvay, succeed in overcoming these engineering difficulties and thus put to use the well known chemistry underlying the ammonia soda process. In fact this was practically within our own time, for Solvay was said to have been fined a million dollars when the Germans captured his home in Brussels. He himself has only recently deceased.

As a result of this automatic temperature control and other instrumentation, the Solvay or ammonia soda process has leaped ahead and surpassed the older La Blanc soda industry. As a matter of fact there is no longer a La Blanc plant remaining in this country. As a matter of fact also there would be not a single La Blanc soda ash plant remaining any place in the world as a result of the successful competition of the Solvay or ammonia soda process due to its advantages through instrumentation, were it not for the fact that the La Blanc soda process furnishes a byproduct, hydrochloric acid. The industrial demand for this byproduct is all that prevents the complete financial failure of the whole process in the face of the competition from the ammonia soda process with superior instrumentation.

Recent Striking Effects of Instrumentation on Industry

The industries of the country divide themselves into two great groups with reference to instrumentation:

(1) Industries using instruments, generally very extensively, but which have in the past been conducted and frequently can still be conducted even at a profit, with practically no instrumentation whatever.

(2) A growing group of industries which never did and never can exist without instrumentation, together with a group of industries which could not today be operated safely and at a profit without the use of instrumentation.

As an illustration of the first group, porcelain manufacturing was carried on for centuries in China (and latterly in this country) with no instruments whatever. The mass production required for porcelain in many uses, such as insulators, spark plugs and the like, have added at least this portion of porcelain manufacture to the group of industries in which instrumentation is *entirely indispensable*. To this group should be added the electrical industries, the great power plants of the country, the manufacture of plate glass by the continuous process, the manufacture of window glass by the mechanical or continuous processes. In all these instrumentation is indispensable.

There is also the second group of industries rapidly growing in numbers which only came into existence because of the developments in instrumentation or which were actually held back for many years, as in the case of the last three just mentioned, until we had developed adequate instrumental control. Outstanding members of the group which could not exist without instrumentation are:

1. The automobile industry.
2. The oil cracking or pressure gasoline industry.
3. The rayon industry.

It is instantly noticed that it is in these very industries that the most phenomenal development of all time has taken place. Probably the greatest marvel of all industry in human history has been the tremendous development in two decades of the automobile industry until it has become practically America's greatest industry. The development of the pressure gasoline industry is unbelievable. The rayon industry has sprung from practically nothing within 15 years, until it is one of the greatest industries of its kind, in the mere manufacture of primary rayon, without going into the making of this material into garments and the like.

A volume would not suffice to tell of the role of instrumentation in this great industrial development. Space permitted mention of only an isolated case here and there. Even these cases could not be treated in detail. We must move on to a discussion of the advantages of instrumentation in industry. It is evident, however, that almost the whole of industry constitutes an example of the developments which result from progressive use of instrumentation.

Development in Gypsum Industry Noted

THE gypsum manufacturing industry has made its greatest growth in the last decade, according to a statement made public by the Bureau of Mines, Department of Commerce. Part of the text of the statement follows:

According to current opinions of producers, future efforts of the gypsum industry should be devoted to the development of new products for structural work. The products should include such items as reinforced roofing and pre-cast units, stress being laid on their desirable fireproofing and insulating qualities. The demand for gypsum-concrete units for use in proper places probably could be stimulated, particularly for roofs, fire walls carrying no load, fire stops, etc. One company is ready to bring out novelties such as toilet sets made of gypsum combined with other materials.

There is opportunity for a great extension in the sale of gypsum for agricultural purposes not only as a fertilizer, but in smaller quantity as a poultry feed and possibly as a sanitary and disinfectant agent for use around poultry houses. Gypsum is a comparatively cheap source of physiological calcium and sulphur, two of the elements important for organic life, plant and animal.

A practicable method of weatherproofing articles or structures made from calcined gypsum promises to open a large market for gypsum products to be used in exterior construction of all varieties.

Monolith Cement Officials Predict Good Year in the Southwest

REFERRING to the large building projects planned in the Southwest for the coming year, Coy Burnett pictured the construction outlook for 1929 as unusually bright at the annual banquet of the Monolith Portland Cement and Monolith Portland Midwest companies recently in the Hotel Alexandria, Los Angeles, Calif.

The banquet, followed by a dance, was attended by 200 of the general office personnel with their families, and representatives of the organization's branch offices in the West. Mr. Burnett is president of the Monolith Portland Cement Co. of California and the Monolith Portland Midwest Co., which is about to open a large plant near Laramie, Wyo., to serve the midcontinent territory.

In view of the projects planned for the new year, Mr. Burnett explained that the Monolith organization was planning its 1929 production on the same basis that it was planned for 1927. Both the California and the Midwest concerns have the same officers.

Other speakers at the banquet, in addition to Mr. Burnett, were C. A. Low, vice-president and general manager; H. C. Gardner, head of the securities department; F. R. Brownell, sales executive; T. R. Larson, assistant to the president, and J. J. Calkins, secretary and treasurer.

Progress of Highway Research Reviewed by Dr. A. F. Woods

EXPENDITURES in the United States for highway research last year probably totaled nearly $1,000,000, declared Dr. A. F. Woods, director of Scientific Research of the United States Department of Agriculture, in an address given before the Highway Research Board of the Division of Industrial Research, National Research Council, in Washington, December 13. The outlay for the year for this purpose by the Bureau of Public Roads alone, he said, was $400,000. Nearly an equal sum was required to support the investigations of the state highway departments and substantial additional outlays were made by the various agricultural experiment stations and colleges. As evidence that money spent for highway research in the past has been well spent, he said it was sufficient to point to the excellence and efficiency of modern highways.

Doctor Woods described the progress of highway research from the early period "when the requirements of horse-drawn traffic were predominant, to the present era of heavy incessant motor vehicle traffic. Early experiments were made with burnt clay as a surfacing material. Sand clay mixtures were tried. In 1893, or thereabouts, the farmer was the largest and indeed almost the only rural road user, and the commonest vehicles were the farmer's buggy and wagon. The gasoline motor and rubber-tire were still beyond the horizon. Under such conditions, methods of road making adapted to traffic light in volume and in weight and limited in range sufficed. For roads for the heaviest traffic the bureau then advocated the macadam surface, not a mere scattering of rocks but a rolled road of two courses, with much emphasis on crown and drainage.

"In the last years of the nineteeenth century the Bureau of Public Roads, in co-operation with the University of Tennessee, devised a recording instrument called a tractograph for the measurement of tractive power. Records made with this tractograph led to experiments that promised to have great importance. The bureau entered upon an investigation of the possibilities of steel roads. In 1898 it laid, on the outskirts of Cleveland, Ohio, a 500-ft. channel-bar trackway set in a macadam surface. This road, as the bureau reported, was laid in a street carrying a heavy volume of traffic and demonstrated the great value of steel in road construction. We might today be traveling on steel tracks had not another group of experimenters hit upon an idea that made radical changes in the character of vehicles and their tires. These experimenters, of course, were the pioneers in motor traction.

"Intensive scientific investigation was started by the bureau about 1905. Each year thereafter it constructed one and sometimes more experimental roads. In these roads experiments were made with various bituminous materials applied as surface treatments. A little later a mixing method—beginning of bituminous concrete—was tried. Rapid strides were made in the development and standardization of tests, and the work resulted in a notable series of circulars entitled "Dust Preventives and Road Binders." In 1911 the bureau began constructing its best-known experimental road. This is in Washington, D. C., on Connecticut avenue, beyond Chevy Chase Circle. Construction was started with bituminous macadam sections; and continued in 1912 and 1913 with the building of bituminous concrete, concrete, and brick sections. When this road was built the country had only about one million motor vehicles. Traffic was still predominantly horse-drawn. Yet the road has lived to serve a constantly increasing traffic of automobiles and motor trucks to the present day.

"For 15 years this stretch of roadway was carefully maintained by the bureau, and a record kept of every expenditure and of all traffic carried. It is believed that no other road anywhere in the world exists for which there is such a parallel record of cost and traffic covering so long a time. The undertaking was followed by what may be termed the modern period of the bureau's experimental work, in the course of which bridge slab tests were begun in 1912, soil pressure tests in 1915, the earlier wear tests in 1919, and the impact experiments in the same year. Analysis of sub-grade soils was begun in 1920 and of traffic surveys in 1922, and many lesser tests and experiments were carried out. This work, in common wth research work in general, has been of fundamental importance in the practical solution of the highway problem."

Doctor Woods urged the Highway Research Board to interest itself in the improvement of roads leading directly to farms. He pointed out that only 300,000 miles of the 3,000,000 miles of public rural roads in the United States are included in the main heavily traveled highways. Farmers are interested in these highways, but they are perhaps more interested, he believes, in the local road mileage outside the main system. He said traffic carried by these local roads is not sufficient to support the types of improvement on which the investigations of the Highway Research Board have mainly been centered.

The board could render an exceedingly important service, in his opinion, by devoting some time and attention to the solution of the problem of the local roads. The Bureau of Public Roads, he continued, has had much success in bringing about co-operation among county and municipal authorities concerning highway administration in certain metropolitan areas. Similar coordination of the resources of rural administrative units, he suggested, should bring about a decided improvement in the efficiency and economy of local road work, particularly if arrangements could be made at the same time for making the advice and assistance of State highway departments available to local road administration forces.

County Prisoners to Operate Pennsylvania Quarry

GREENE COUNTY, Pennsylvania, may soon have a penal farm, according to plans now under consideration by the county commissioners, it was learned recently.

The commissioners, it is understood, are considering purchasing or leasing a farm near Waynesburg underlaid with limestone in sufficient quantities to be quarried for use in constructing and resurfacing county highways. For the past five years there have been an average of from 30 to 40 prisoners in the jail at all times, and this number is considered large enough to operate a good-sized quarry.—*Pittsburgh* (Penn.) *Press.*

Hints and Helps for Superintendents

Quarry Operating Pointers

AT the Sturgeon Bay, Wis., quarry of Dolomite, Inc., are four well drills working on the upper bench. This bench is now the company's principal source of stone. The quarry face it about 1800 ft. long and the practice is to shoot half the length of this deposit at a time. The quarry track haulage system is laid out in the form of two separate loops so that loading by the new electric shovel is not interrupted by the blasting or by any track-shifting operations. Four trains of 7 cars are available for the one shovel so that there is no delay from lack of cars for the shovel to load.

Protecting well-drill holes

The extra labor charges for operators of this number of locomotives is insignificant when compared to the extra tonnage obtained.

One other interesting kink was noted in the drilling. As the well drill squad advanced along the upper bench with their drilling operations, the holes are protected from dirt infiltration by simply laying a short piece of old conveyor belt over the hole. The wood plugs that most operators use for this purpose make fine wood to take home, or else they are destroyed by blasting, but this form of protector is practically indestructible and also answers the often heard question of the warehouse man, "What the H—— are we going to do with this old belting."

Broadcast Your Good Ideas

THIS department of Rock Products is specifically for the operating man—"a shrinking violet" when it comes to making literature. But through these columns we aim to initiate him into the ranks of writers and authors. It takes but a few minutes' time, a pencil sketch, blueprint, or photograph to embark on this literary venture—and the reward, in addition to the personal satisfaction of being a writer, is $5 per "hint," for anything less than a column and proportionately for longer stories. We invite our operating men readers to join our Hints and Helps Contributors' Club. Now, while you are awaiting the big spring opening is a good time to join.—The Editors.

Simple Device Insures Bucket Elevator Clearance

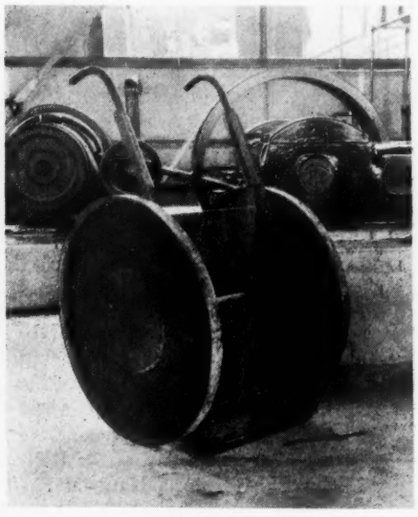
VERY often it is necessary to install a bucket elevator in an old plant in a very small space or at a location that is such that it is a very difficult matter to prevent the bucket string from striking some cross timbers. Either the obstruction must come out, which is often not an easy matter, or means must be devised to overcome the objectionable features.

At Marblehead, Wis., at the Western Lime and Cement Co.'s spall crushing plant, a discarded pulley was lagged with old belting and placed so as to idle against the bucket line on the upcoming side of the bucket elevator, thus preventing the buckets from striking a cross timber below. The pulley must necessarily be of large diameter and should only be used on small, slow-moving installations.

Device that insures bucket elevator clearance

A "Gas" Carriage Where Wheels Are Scarce

AT a rock crushing plant in northwestern Ontario it was necessary to have easy means of hauling the oxygen and acetylene tanks to the places of use, so the master mechanic built a carrier the details of which can be seen in the accompanying picture.



Truck for handling oxy-acetylene welding equipment

The wheels are simply made of $\frac{3}{16}$-in iron plate with a welded strap rim and having a bearing consisting of a short piece of pipe of suitable diameter to accommodate the shaft on which is welded the tank support. This picture was taken in the repair shop of the Greenville Crushed Stone Co., Ltd., Hawk Lake, Ont.

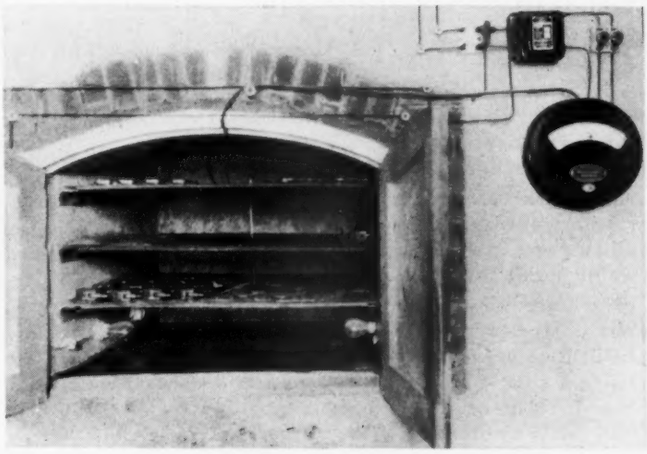
It should be mentioned, of course, that there is standard equipment made for this purpose—just the same as there is for many of the "kinks" shown on these pages. Nevertheless the home-made article is often satisfactory and can be made to incorporate new or original ideas.

A Constant Temperature Damp Closet

ALTON J. BLANK
Compania de Cemento Portland "Landa"
Puebla, Mexico

THE accompanying photograph shows a damp closet that was originated by the writer. In using this closet 6 in. of water is kept in the bottom for the purpose of keeping the air saturated.

Three shelves are in use for the storage of neat cement pats during the time the initial and final setting times of the cement are determined, and for the remaining period, constituting a total of 24 hours before the pats are taken out and subjected to the steam test. Briquettes made up daily on the average grind and shipments are also stored in the closet for 24 hours, as are the smaller size cubes, cylinders, etc.



Constant temperature damp closet

Situated just below the bottom shelf, and between this shelf and the water, are four ordinary electric light globes which are operated in connection with a Brown Instrument Co. temperature recorder. When the temperature in the damp closet falls below 21 deg. C. the recorder automatically switches on the light of the four bulbs and the heat generated is generally sufficient to raise the temperature of the air in the damp closet to 21 deg. within a few minutes. When this temperature is reached the recorder automatically switches off the lights.

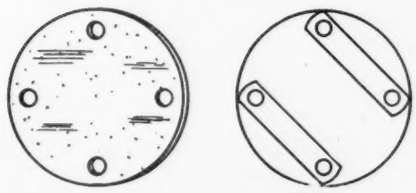
This type of damp closet is especially well adapted for storage of cement pats, briquettes, cubes, cylinders and the like during the summer months as well as during the winter.

A similar arrangement is also being fitted up for keeping at more or less constant temperature the water in the briquette tanks by means of a Brown recorder rigged up in connection with a series of electric light bulbs arranged in rows beneath each briquette tank. Each tank is partially enclosed.

Improvement for Flexible Couplings

CHARLES LABBE
Death Valley Junction, Calif.

FOR small size flexible couplings using leather links as the connection between the studs. I have found that a plain leather washer of the same size as the coupling is an improvement over a number of links which are usually used.

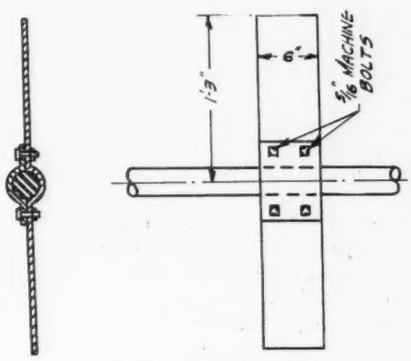


Improvised improvement for small flexible couplings

The holes to fit the studs on both plates are punched in the washer the same size and at the same places as they would be for links. This single piece washer is easy to hold and place over the studs, is stronger than the links and lasts longer. Also the rotation can be reversed without any difference on the leather.

Shop Ventilation

IN the repair department of the Columbia Quarries Co., Krause, Ill., there is an ingenious device for ventilating and circulating the air in the machine shop. During the hot weather months this fan, for that is what it amounts to, does much to make working conditions more pleasant and agreeable. There is no question but that this tends to better workmanship and higher output per man. The contrivance is so simple in design and easy to install that there are many places not only in the shop but in plant as well, where the idea could be used to advantage.



Shop ventilating kink

The "kink" is nothing more or less than a home-made fan blade 6 in. wide by 30 in. long made from No. 8 or 10 iron. The blade is made in two sections, the smaller section acting as a cap with which to bolt the larger section on any convenient piece of moving shafting. At the above plant the blade was attached to a small line shaft used to drive the lathe and drill press and was running at sufficient speed to cause a rapid movement of air through the entire shop.

Getting Out Stone for Canadian Railroad Ballast

AT the first glance at the accompanying picture of the screening plant of the Grenville Crushed Stone Co., one could well picture it as being very close to some large industrial center, judging from the wide sweep of well-kept roadbed in the foreground. On the contrary, it is up in a wild

Advantage of adequate switching facilities to a crushed-stone railway ballast plant

section of Canada at Hawk Lake, Ont. This view well illustrates the thoroughness and up-to-dateness of the Canadian Pacific's railroad system, as it is forcibly brought home to one when switching yards like this are built to serve such ballast operations as the one referred to above. This company is ballasting its double track system from Winnipeg, Man., to Ft. Williams, Ont., and the stone from this plant is being used for this purpose.

Incidentally, there is no feature of quarry operation more frequently overlooked or slighted than its transportation system. There is real economy in an adequate yard system and in properly maintained track and roadbed. Even the whole scheme of transportation can often be investigated and redesigned to advantage. In the case cited storage of ballast is avoided.

New Gravel Plant for Northern Wisconsin

BAYFIELD COUNTY, Wis., is soon to have a new company which will have for its purpose the establishment of a commercial washed gravel plant which will be located in the town of Iron River.

Mr. Holmes, former division engineer of the division in which Bayfield county is located, will be the head of the new company and he will have associated with him men of capital who will engage in the business on a large scale.

The new company has already secured options on property on the south side of Moon lake, where the plant will be established, and it is said the gravel bed at that point is large enough to keep a large plant in operation for a long term of years.

The first intimation of the formation of this company was recently given when Mr. Holmes appeared before the county board at the annual meeting and asked that an agreement be entered into between the new company and Bayfield county wherein the county agrees to sell to the new company any and all of its gravel which it may not need, the object of the agreement being to protect the company against the sale of gravel by the county.

Bayfield county owns a fine pit at this point and the gravel from their pit has been used for graveling Highway No. 2 and County Trunk Highway A. The supply is almost inexhaustible.

The new company will wash the gravel and will sell it for concrete work.—*Washburn* (Wis.) *Times.*

Rock Asphalt Plant to Be Built in Missouri

THAT a large plant for the pulverizing of rock asphalt mined in the Deerfield, Mo., neighborhood, for use in paving, is to be constructed at once near Deerfield, and that the first of the machinery of the plant will be on the ground as early as January 15, was the announcement made by Thomas H. Bellrose, of Ottawa, Ill., who for the past three years has been working steadily to prove the quality of the rock asphalt as a paving material, and to secure the necessary capital to exploit it.

Mr. Bellrose stated that all of the machinery for the plant has been ordered; that it is expected that a large steam shovel will be on the ground by about January 15, and that the work of getting out the asphalt in large quantities will be commenced immediately.

Crushers and pulverizers, and Deisel engines to run the machinery of the plant are expected to arrive about March 1, and it is hoped that all machinery will be installed and adjusted in time to begin actual production by May 1.

The capacity of the plant, it is estimated, will be about 100 tons of asphalt an hour, and, according to the men behind the new concern, it will be the cheapest good paving material available—far cheaper than Kentucky asphalt. It is claimed that the quality of the rock asphalt as a paving material has been thoroughly tested, and that it has been found to be entirely satisfactory in every way.

One test recently made was the placing of some of the Deerfield rock asphalt on sections of the concrete paving on U. S. Highway No. 71, Joplin to Kansas City, where flood waters had caused depressions. These depressions were filled with the asphalt, restoring a smooth surface. The asphalt is reported to be standing up well under heavy traffic.

Mr. Bellrose, arriving here today, brought with him blueprints of the rock asphalt plant, in general, and spent some time conferring with interested local men.

The plant will probably be located a short distance north of Deerfield, where Mr. Bellrose has for a long time been operating a sort of prospect pit, and where he and his associates have land under lease. With the coming of the necessary machinery, the prospect pit will be converted into a large excavation.—*Ft. Scott* (Kan.) *Tribune.*

Hercules Portland to Start Soon on Construction of Los Angeles Mill

NOTICES in several Los Angeles papers state that the Hercules Portland Cement Co. of Philadelphia, Penn., has acquired 102 acres of land at Torrance, Calif., near Los Angeles, and is preparing plans for a Pacific Coast mill to be erected on the property. The new plant will be built at a cost of $4,000,000, it is announced, and will be modern in every respect. The output, according to present plans, will be 5000 bbl. per day, and the plant will employ about 400 men. Work on the first group of eight buildings will be started in April. The company's engineering department is in charge.

Atlantic Gypsum Products Co. Owns Cheticamp Property

ACCORDING to a Philadelphia newspaper, denial has been made of reports in circulation recently that the United States Gypsum Co. of Chicago is interested in the gypsum quarries and plant at Cheticamp, Cape Breton, Nova Scotia. The Atlantic Gypsum Products Co. of Boston states that the quarries and development work at Cheticamp are its property; that it has no connection whatever, other than competitive, with the United States Gypsum Co. and that it is important, in view of the competitive situation in the gypsum industry and "particularly in connection with current tariff complications" that these facts be known.

Effect of Working Gypsum Mixes After Stiffening

CALCINED GYPSUM for certain purposes, such as for use in construction, must have a fairly quick set when mixed with water. However, sufficient time must be allowed to permit thorough mixing of the material and pouring into the forms before it starts to set. It has been generally accepted that the gypsum is useless if set has started before it is in place, inasmuch as little strength can be expected from the gypsum when worked through the set. Preceding the set a stiffening of the calcined gypsum putty occurs, and the question arose as to whether the material could be used after the stiffening of the putty had started. Some tests have been made to determine for what period the putty can be worked without materially reducing the strength of the set gypsum.

A large batch of calcined gypsum was mixed with sufficient water to bring it to standard consistency, and 3x6-in. cylinders were cast two minutes after mixing, and at one-minute intervals thereafter until the paste was too stiff to be forced into the mold, even by using considerable pressure. A typical set of results follows:

Time after adding water	Compressive strength Lb./in.²
2 minutes	1070
3 minutes	1060
4 minutes	1100
5 minutes	1070
6 minutes	910
7 minutes	710

The material for the specimens at six and seven minutes had to be pressed into the mold. Similar results have been obtained using retarded mixes with longer time intervals between the casting of the specimens and using mixes containing various proportions of wood chips. It seems evident, therefore, that no weakening of the set gypsum occurs when the paste may be molded or formed without exerting undue pressure.—*Technical News Bulletin* of the U. S. Bureau of Standards.

The Development of the Shale Planer

SOME interesting cost figures are given in connection with the operation of shale planers in the October, 1928, issue of the *Journal of the American Ceramic Society,* Volume II, No. 10. Forrest Tefft discusses the development of the shale planer from the first machine built by J. M. Powell, 14 years ago, to the latest and largest types. Actual operating costs and advantages are cited. At one plant 450 tons of shale was cut from a 26-ft. bank in nine hours. An actual power cost from other records where 56,810,000 brick were produced showed an electric power cost of 1.4 cents per ton of shale. No other system yet devised could quarry, load and crush shale at such a low power cost and have, as well, the additional advantage of absolutely uniform mixtures.

Editorial Comment

Auspicious Opening

Forecasts by the Shippers' Regional Advisory Boards, of the railways, which constitute one of the most accurate authorities on business forecasts, predict a 2.7% increase in portland cement shipments; 2.3% in lime and plaster; and a 3.9% increase in gravel, sand and stone shipments for the first quarter of 1929 over the same period of 1928. It will be remembered that in the early part of 1928 construction was rather slow in picking up, but that the year ended in almost a construction boom; due presumably to psychological reasons—a hesitation to start new construction in a presidential election year—and a very rainy spring. This year nearly everyone believed that the late starting of construction last year, and its impetus at the end of the year, would carry over a big volume of construction for the first six months of 1929. Reports for the month of January show an actual decrease in volume of construction as compared with January, 1928, of about 4%. This is not at all discouraging because of the very severe weather conditions which have prevailed throughout the northern half of the country since the first of January. All the prophets continue to predict a big construction year.

Irony in Concrete Improvement

At the very time hundreds of engineers and technical experts were meeting in Detroit as the American Concrete Institute—to still further perfect the design and construction of concrete—the Chicago newspapers came out with the results of a core-drill survey of city pavements laid during the past few years. Quoting the *Chicago Tribune* of February 13: A summary of the report of the core tests is as follows: 58% of the cores showed the pavement to be thinner than specified in the contracts. The average difference between the contracted thickness and the actual pavement was 0.846 of an inch. Some 41% of the cores showed that the paving was deficient in strength, the average deficiency being 37%. Thirty-six paving jobs were covered by the investigation, two cores being taken from each job. Forty-four were of pavements with concrete bases and asphalt tops. Of these, 33 cores showed an average shortage of 15% in thickness. Of 28 solid concrete samples, 13 had an average shortage in thickness of 10%.

To engineers and laboratory workers, who have expended millions of dollars in experiments and research to increase the strength of concrete used in pavements a small per cent, such facts as brought out in Chicago shed an ironical light on "water-cement ratio," "grading of aggregate," "crushed stone vs. gravel aggregate," etc., etc. While we are gradually eliminating the unknowns of materials and the human factors of workmanship, mismanagement and dishonest or incompetent municipal government and politics-playing contractors present human factors which affect the quality of concrete far more than all the factors studied and "researched" by scientific men. Our only hope is that men who love truth and honesty as do engineers may have an opportunity some time to control politics as well as materials and workmanship.

The Sherman Anti-Trust Law

The rock products industry has opened fire on the Sherman anti-trust law. At the suggestion of its retiring president, Otho M. Graves, the National Crushed Stone Association will begin the first organized attack of rock products producers, that has come to our notice, for a repeal or change in the anti-trust laws to permit greater freedom of cooperation between competitors. Just what changes in the law are desired was not made clear at the recent convention, out of which this move has come. It would seem, however, from the general drift of conversation and comment, that what is desired is the legalizing of pools, division of territory and price agreement—always, of course, in such a way as to place the public welfare uppermost in consideration.

It is interesting that at the same convention, Dr. Hugh Baker, of the trade association department of the Chamber of Commerce of the United States, spoke in such a way that one may logically draw the conclusion from his remarks that even under the present anti-trust laws, as now interpreted by the courts, an organized industry may do practically everything that is economically sound to better its condition.

In other words, the point of the debate which has thus been opened, and will probably continue with growing intensity, is not merely whether the Sherman law obstructs what should be legitimate agreements between competitors, but whether such agreements as pooling of output, division of territory and price-fixing are really sound economic principles. In spite of much that is said to the contrary the fact remains that industries and individuals have prospered mightily in this country under the Sherman anti-trust law; and there is very good reason to believe that the economic principles it attempts to define are among the soundest ones in our whole business structure. Of course, the law may be much clarified in its definition of these principles, in the light of modern business practice and experience; but everything goes to prove that the underlying principles themselves are sound.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[39]	2-14-29	90	.....	
Alpha P. C. new com.	2-11-29	54	56	75c qu. Apr. 15
Alpha P. C. pfd.[2]	2-11-29	116	.....	1.75 Mar. 15
American Aggregates com.	2-14-29	50	52	75c qu. Dec. 1
Amer. Aggregate 6's, bonds	2-14-29	113	113¾	
American Brick Co.	1-31-29	18¼	.....	25c qu. Feb. 1
American Brick Co. pfd.	1-14-29	89	94	50c qu. Feb. 1
Am. L. & S. 1st 7's[29]	2-14-29	100	101	
American Silica Corp. 6½'s	2-14-29	96	100	
Arundel Corp. new com.	2-11-29	40¾	41	50c qu. Jan. 2
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	2-14-29	.....	80	
Atlas P. C. com.	2-11-29	53	55	50c qu. Dec. 1
Atlas P. C. pfd.	2-11-29	50	60	66⅔c qu. Jan. 2
Beaver P. C. 1st 7's[20]	2- 8-29	99	100	
Bessemer L. & C. Class A[4]	2- 8-29	36	36¾	75c qu. Feb. 1
Bessemer L. & C. 1st 6½'s[4]	2- 8-29	99¾	100½	
Bloomington Limestone 6's[29]	2-14-29	92	.....	
Boston S. & G. new com.[16]	2-11-29	18	21	
Boston S. & G. new 7% pfd.[16]	2-11-29	50	52	
Canada Cem. com.[45]	2-11-29	28½	30	
Canada Cem. pfd.[45]	2-11-29	98	98¾	1.62½c qu. Dec. 31
Canada Cement 5½'s	2- 8-29	101	102	
Canada Cr. St. Corp. 1st 6½'s	2- 8-29	96	99	
Canada Gyp. & Alabastine	2-11-29	88½	90	75c Jan. 2
Certainteed Prod. com.	2-13-29	23½	23¾	$1 qu. Oct. 1
Certainteed Prod. pfd.	2-11-29	63	70	1.75 qu. Jan. 1
Cleveland Stone new st'k	2-13-29	63	75	50c qu., 25c ex. Mar. 1
Columbia S. & G. pfd.	1-25-29	93¾	95	
Consol. Cement 1st 6½'s, A[42]	2-14-29	93	96	
Consol. Cement 6½% notes	2-14-29	91	95	
Consol. Cement pfd.[20]	2-14-29	50	60	
Consol. S. & G. com. (Canada)	2-11-29	17	18	
Consol. S. & G. pfd. (Canada)	2-11-29	95	97	1¾% qu. Nov. 15
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	2- 8-29	98	99½	
Coosa P. C. 1st 6's[29]	2-14-29	50	55	
Coplay Cem. Mfg. 1st 6's[40]	2-11-29	90	.....	
Coplay Cem. Mfg. com.[40]	2-11-29	15	.....	
Coplay Cem. Mfg. pfd.[40]	2-11-29	75	.....	
Dewey P. C. 6's[30]	2-14-29	99	103	
Dolese & Shepard[7]	2-12-29	120	124	$2 qu. Jan. 1
Edison P. C. com.[19]	2- 6-29	50c	.....	
Edison P. C. pfd.[19]	2- 6-29	1	.....	
Edison P. C. bonds[19]	2- 6-29	75	.....	
Giant P. C. com.	2- 8 29	40	45	
Giant P. C. pfd.	2- 8-29	40	43	3½% Dec. 15
Ideal Cement, new com.	2-13-29	80	84	75c qu. Jan. 2 & 50c ex. Dec. 22
Ideal Cement 5's, 1943	2- 9-29	110	112	
Indiana Limestone 6's	2-13-29	90½	91½	
International Cem. com.	2-13-29	93	94	$1 qu. Dec. 28
International Cem. bonds 5's	2-13-29	113⅝	115	Semi-ann. int. payable June 15
Iron City S. & G. bonds 6's[40]	2- 9-29	95	99	
Kelley Is. L. & T. new st'k	2-13-29	48½	59	62½c qu. & 50c ex. Jan. 2
Ky. Cons. Stone Co. com.[48]	2- 7-29	13	13¾	
Ky. Cons. St. com. Voting Trust Certif.[48]	2- 7-29	13	13½	
Ky. Cons. Stone 6½'s*[48]	2- 7-29	96	100	
Ky. Cons. St. Trustee Certif.[48] (1 Sh. 7% cum. pfd. & 1 sh. com. stock)	2- 7-29	98	100	1.75 Nov. 1
Keystone Sand & Sup. 6's[17]	8-22-28	99	100	
Lawrence P. C.[2]	2-11-29	97	102	2% qu. Sept. 29
Lawrence P. C. 5½'s, 1942	2- 6-29	95	.....	
Lehigh P. C.[2]	2-13-29	63	63½	62½c. qu. Feb. 1
Lehigh P. C. pfd.[2]	2-13-29	109½	110	1¾% qu. Apr. 1
Lyman-Richey 1st 6's, 1932[18]	1-25-29	99	100	
Lyman-Richey 1st 6's, 1935[13]	1-25-29	98	99½	
Marblehead Lime 1st 7's[14]	2- 8-29	105	.....	
Marbleh'd Lime 5½'s, notes[14]	2- 8-29	100	.....	
Material Service Corp.	2-13-29	39	39½	
Mich. L. & C. com.[6]	2-11-29	35	.....	
Missouri P. C.	2-13-29	53¾	54¼	50c qu. Feb. 1
Monolith Midwest[9]	2- 7-29	8	10	
Monolith P. C. com.[9]	2- 7-29	16	16¼	8% ann. Jan. 2
Monolith P. C. pfd.[9]	2- 7-29	8¾	9¼	
Monolith P. C. units[9]	2- 7-29	33½	35½	
National Cem. (Can.) 1st 7's[38]	2- 9-29	99	101	
National Gypsum A com.	2-12-29	16	19	
National Gypsum pfd.[35]	2-12-29	52	56	1¾% qu. Apr. 1
Nazareth Cem. com.	2- 8-29	27	30	75c qu. Apr. 1
Nazareth Cem. pfd.	2- 8-29	102	105	
Newaygo P. C. 1st 6½'s[29]	2-14-29	102	.....	
New Eng. Lime 1st 6's[14]	2- 8-29	98	100	
N. Y. Trap Rock 1st 6's	2-13-29	100¼	.....	
North Amer. Cem. 1st 6½'s	2-13-29	75½	.....	
North Amer. Cem. com.	2-14-29	10	14	
North Amer. Cem. 7% pfd.	2-14-29	30	.....	1.75 qu. Aug. 1
North Amer. Cem. units	2-14-29	35	.....	
North Shore Mat. 1st 5's[15]	2-14-29	98½	.....	
Northwestern States P. C.[37]	2- 8-29	195	205	
Pac. Coast Cem. 6's, A	2- 7-29	95	96½	
Pacific P. C. com.	2- 8-29	28	31	
Pacific . P. C. pfd.	2- 8-29	80	84	1.62½ qu. Jan. 5
Pacific P. C. 6's	2- 7-29	98	99½	
Peerless Egyp'n P. C. com.[21]	2-11-29	2	3	
Peerless Egyp'n P. C. pfd.[21]	2-11-29	85	90	1¾% qu. July 1
Penn-Dixie Cem. 1st 6's[29]	2-13-29	96	97¼	
Penn-Dixie Cem. pfd.[28]	2-13-29	90	91	1.75 qu. Mar. 15
Penn-Dixie Cem. com.	2-13-29	22¾	23	50c qu. July 1
Penn. Glass Sand Corp. 1st 6's, 1952	2- 6-29	103½	104½	
Penn. Glass Sand pfd.	2- 6-29	112	.....	
Petoskey P. C.	2-11-29	9¼	10	1½% qu.
Riverside P. C. com.	2- 8-29	20	.....	
Riverside P. C. 1st pfd.	2- 8-29	95	97	1.50 Aug. 1
Riverside P. C., A.	2- 8-29	.....	21	31¼c cum. part. Aug. 1
Riverside P. C. B.	2- 8-29	1	.....	
Sandusky Cem.	2-13-29	260	300	$2 qu. Jan. 1 & $4 extra
Santa Cruz P. C. bonds	2- 7-29	105¾	.....	6% annual
Santa Cruz P. C. com.	2- 7-29	89	90	$1 qu. Jan. 1 & $2 ex. Dec. 24
Schumacher Wallboard com.	2- 8-29	14½	16½	50c May 15
Schumacher Wallboard pfd.	2-8-29	23	24¾	
Southwestern P. C. units[44]	2- 8-29	270	.....	
Superior P. C., A[26]	2- 8-29	46½	48	27½c mo. Dec. 1
Superior P. C., B[26]	2- 8-29	32½	34	
Trinity P. C. units[37]	2- 8-29	156	165	
Trinity P. C. com.[37]	2- 8-29	50	58	
U. S. Gypsum com.	2-13-29	63	64	2% qu. Mar. 31
U. S. Gypsum pt. paid	2-13-29	48	49	
U. S. Gypsum pfd.	2-13-29	128	.....	1¾% qu. Mar. 31
Universal G. & L. com.[3]	2-14-29	.....	50c	
Universal G. & L. pfd.[3]	2-14-29	5	10	1½% Feb. 15
Universal G. & L., V.T.C.	2-14-29	No market		
Universal G. & L. 1st 6's[3]	2-14-29	50	60	
Chas. Warner com.	2-11-29	47	51	50c qu. Jan. 12 & 50c ex
Chas. Warner pfd.	2-11-29	109	.....	1¾% qu. Jan. 24
Whitehall Cem. Mfg. com.[36]	1-30-29	150	.....	
Whitehall Cem. Mfg. pfd.[36]	1-30-29	98	.....	
Wisconsin L. & C. 1st 6's[15]	2-14-29	100	.....	
Wolverine P. C. com.	2-13-29	.....	7	15c qu. Feb. 15
Yosemite P. C., A com.[20]	2- 7-29	6	7	

*Ann. interest due May 1 and Nov. 1. Semi-ann. coupon of $32.50 paid Nov. 1.

[1]Quotations by Watling Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willet, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., Detroit. [22]Pirnie, Simons and Co., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach & Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White & Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter & Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick & Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, New York City and Chicago. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney Williams & Co., Inc., Los Angeles, Calif. [46]Stein Bros. & Boyce. Baltimore, Md. [47]Bank of Pittsburgh, Pittsburgh, Pa. [48]E. W. Hays & Co., Louisville, Ky.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
American Brick Co. pfd. (sand-lime brick) 16 sh.[6]	par 25	25¾
Benedict Stone Corp. 1st 7's 1934[8]	.....	86
International Portland Cement Co., Ltd., pfd.	30	45
Knickerbocker Lime Co.[4]	105	.....
River Road Sand and Gravel Co.,[9] 200 shares	$21 per share	.....
River Road Sand and Gravel Co.,[11] 219 shares	$55 per share	.....
Seaboard P. C.[1] 6% bonds ($7,500) 7-1-27. July, 1910, and subsequent coupons attached	$10 for the lot	.....
Southern Phosphate Co.[6]	1¼	.....
Universal Gypsum com. free stk.[1] 300 shares	$75 for the lot	.....
Universal Gypsum com.[1] 153 shares (no par)	$51 for the lot	.....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	.....
Winchester Brick Co., pfd., sand lime brick[5]	10c	.....
Winchester Rock Brick Co. pfd., 1 share (par $25) and 1 share com. (par $10)[6]	$8 for the lot	.....
Winchester Brick Co. pfd.[10] 250 sh. (par $10)	$100 for the lot	.....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price at auction by R. L. Day & Co., December 26, 1928. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, on April 4, 1928. [5]Price obtained at auction for lot of 50 shares by R. L Day & Co., Boston, Mass. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass. [8]Auction sales of $1000, Barnes & Lofland. Philadelphia, March 31, 1928. [9]Price obtained at auction by Barnes & Lofland, Sept. 26, 1928. [10]Price at auction Dec. 19, 1928, R. L. Day & Co., Boston, Mass. [11]Price at auction, Nov. 21, 1928, by Barnes & Lofland.

Kentucky Consolidated Stone Co.

THE Kentucky Consolidated Stone Co., Louisville, Ky., a consolidation of seven Kentucky crushed-stone companies operating ten plants, whose flotation of a $600,000 bond issue was noted in ROCK PRODUCTS, May 26, 1928, has recently issued a financial statement through E. W. Hays and Co., bankers, Louisville, Ky., in part as follows:

With the railroad appropriations available after January 1, 1929, and the intensive road building program in full swing by spring, it is believed that the output of the Kentucky Consolidated Stone Co. will show a considerable increase in 1929, as well as a consistent record of production throughout the year.

Average railroad consumption over the past five years from the quarries now owned by the Kentucky Consolidated Stone Co. has been at the rate of 600,000 tons annually. Undoubtedly new construction and betterments by the railroads served will result in increased demand for the company's products.

The company at present is shipping 100 cars daily of various grades of crushed stone and expects to increase daily shipments to 150 cars by May 1.

The demand for agricultural limestone is growing rapidly and the company is developing the market and equipping its plants for the production of this valuable commodity. Recent tests prove the use of powdered limestone increases the production of soil from 25% to 50%.

The company begins 1929 with approximately 500,000 tons in unfilled tonnage on its books comprising orders from both railroads and for highway purposes. The double track project of the Southern Railroad from Danville to Cincinnati will require 450,000 to 600,000 tons of crushed stone and preliminary orders from contractors who have the work in charge have been received by the company for delivery from the High Bridge plant. It is expected that the Tyrone and High Bridge plants will supply a good part of the Southern Railway needs.

The highway commission has approximately $18,000,000 annually available for new construction and repairs to state roads. This amount represents automobile license tax and the 5c. per gallon gasoline tax. Fifty per cent of the stone is consumed in repairs and replacements on existing roads, and the balance in new construction.

The plants of the company are in excellent working condition and no major improvements or replacements are at present contemplated by the management.

MANAGEMENT—The active management of the company is in the hands of men who operated successfully some of the constituent properties in the past. The officers are: A. J. Hoffman, president; Robert N. Cox, vice-president-general manager; C. W. Lovell, vice-president in charge of sales; Verne C. Morgan, secretary and treasurer.

DIRECTORS—Dunlap Wakefield, E. W. Hays and Co., brokers, Louisville, Ky., chairman; A. J. Hoffman, president, Kentucky Consolidated Stone Co., Louisville, Ky.; I. W. Iglehart, vice-president, Baltimore Trust Co., Baltimore, Md.; Monro B. Lanier, Birmingham, Ala., president, Norton Coal Mining Co., Monro-Warrior Coal and Coke Co., Kentucky Consolidated Power and Utilities Co.; H. A. Orrick, Jr., Hambleton and Co., investment bankers, Baltimore, Md.; transfer agent and registrar, National Bank of Kentucky, Louisville, Ky.

CAPITALIZATION—

	To be authorized	To be outstanding
First (closed) mortgage 6½% ten-year sinking fund gold bonds	$1,000,000	$1,000,000
7% cumulative preferred stock (par value $100)	1,000,000	600,000
Common stock (no par value)..(shs.)	100,000	100,000

EARNING STATEMENT FOR THE SIX MONTHS ENDING OCTOBER 31, 1928

Sales (net)		$522,858.12
Cost of sales		314,397.42
Gross operating profit		$208,460.70
Expenses		
Selling	$ 5,397.41	
Administrative and general	25,677.78	
Total expenses		$ 31,075.19
		$177,385.51
Other income (net)		6,376.17
Net income—available for depreciation, interest, taxes and dividends		$183,761.68

Bonds of $36,500 par value were retired November 1 and a reserve set up to retire $15,000 preferred after January 1, 1929. The sinking fund calls for the retirement of 5% of the maximum outstanding preferred stock annually. The preferred is to be retired at any time $5,000 is available in the sinking fund. The company, during the first six months of operation, has had heavy non-recurring items charged against operations for that period. The properties were not under the direct control of the company until several months after the consolidation, and expenses and salaries for that period were excessive and charged directly against cost of operation.

The inventory item includes only materials and supplies on hand and no inventories of stone are shown at any time. The organization expense of the company, of which there is a balance of $19,500, is to be written off by May 1, 1929.

The operating costs of the company were below the average for the industry, as shown by the reports of the National Crushed Stone Association, and it is expected that these costs will be lowered considerably in the next year's operation.

BALANCE SHEET

ASSETS

Current		
Cash		$ 109,209.77
State road warrants		35,022.60
Bills receivable		22,538.68
Accounts receivable		157,366.33
Inventories		46,224.80
		$ 370,362.18
Other assets		$5.50
Fixed		
Quarries and equipment as appraised by Richard K. Meade and Co., Baltimore, Md.		$5,000,000.00
Additions and betterments		35,932.26
Furniture and fixtures		3,302.26
		$5,039,234.62
Deferred		
Prepaid expenses		$ 3,271.31
Discount on stocks and bonds		127,548.93
Organization expense		19,532.44
Unexpired insurance		12,910.89
		$ 163,263.57
		$5,572,865.87

LIABILITIES

Current		
Notes payable—assumed		$ 16,000.00
Accounts payable—For purchases, expenses, etc.		51,087.79
		$ 67,087.79
Accrued		
Interest on bonds payable		$ 32,500.00
Insurance—workmen's compensation and public liability		1,988.89
		$ 34,488.89
Fixed		
First mortgage 6½% sinking fund gold bonds		$1,000,000.00
Reserves		
Sinking fund reserve—		
6½% gold bonds		$ 35,000.00
7% cumulative preferred stock		11,250.00
		$ 46,250.00
Nominal		
Capital stock		
7% cumulative preferred stock—outstanding		$ 600,000.00
Common stock and surplus (represented by 100,000 shares of common stock without par value, issued and outstanding):		
Surplus	$3,756,486.72	
Undivided profits	68,552.47	
		3,825,039.19
		$4,425,039.19
		$5,572,865.87

Du Pont Denies Merger

OFFICIAL DENIAL has been made by E. I. du Pont de Nemours and Co. of any negotiations with Mathieson Alkali works for a merger.—*Wall Street News* (New York City).

Monolith Companies Consolidate

PURCHASE of all standing common of the Monolith Portland Midwest Co. by the Monolith Portland Cement Co. is announced by Roy Burnett, president. Purchase has been approved by the stockholders of Monolith Portland Cement Co. This consolidation brings together two of the leading cement companies operating in Wyoming and California and will create a company with an appraised valuation in excess of $10,000,000.

Recent Dividends Announced

Alpha P. C. com. (quar.)....75c, Apr. 15
Alpha P. C. pfd. (quar.)....$1.75, Mar. 15
Cleveland Stone (extra div.) 25c, Mar. 1
International Agricultural Corp. prior pfd. (quar.)....1¾%, Mar. 1
Lehigh Portland Cement com. (quar.) ....62½c, Feb. 1
Lehigh Portland Cement pfd. (quar.) ....$1.75, Apr. 1
Missouri Portland Cement (quar.) ....50c, Feb. 1
Pennsylvania-Dixie Cement pfd. (quar.) ....1¾%, Mar. 15
Raymond Concrete Pile new com. 25c extra and quar. dividend of ....50c, Feb. 1
Raymond Concrete Pile pfd. (quar.) ....75c, Feb. 1
U. S. Asbestos com. (quar.) 75c, Feb. 1
U. S. Asbestos pfd. (quar.) $1.75, Feb. 1
U. S. Gypsum com. (quar.)..40c, Mar. 31
U. S. Gypsum pfd. (quar.)..$1.75, Mar. 31
Virginia-Carolina Chem. prior pfd. (quar.)....1¾%, Mar. 1
Wolverine Portland Cement (quar.) ....15c, Feb. 15

Sand-Lime Brick Association Holds Twenty-Fifth Convention

Washington, D. C., Meeting, February 5-7, Discusses Many Phases of the Industry

THE SILVER ANNIVERSARY of the Sand-Lime Brick Association was held in Washington, D. C., February 5-7. The program, as usual, covered nearly every phase of the industry. One day was spent at the Bureau of Standards, where inspection was made of a fire test of a sand-lime brick building wall.

New Officers

The following officers were elected for the ensuing year: President, A. G. Walton, Hummelstown Brownstone Co., Hummelstown, Penn.; vice-president, A. S. Robertson, Harbour Brick Co., Ltd., Toronto, Ont.; treasurer, J. Finkbeiner, Michigan Pressed Brick Co., Detroit, Mich.; secretary, Ellen Knight, Saginaw Brick Co., Saginaw, Mich. The executive committee consists of C. H. Carmichael, chairman, American Brick Co., Boston, Mass.; John L. Jackson, Saginaw Brick Co., Saginaw, Mich.; Otto Schwartz, American Brick Co., New Orleans, La.; W. A. Smyth, York Sandstone Brick Co., Ltd., Toronto, Ont.; J. G. Schluchter, Rochester Sand and Brick Co., Detroit, Mich.; E. W. Smythe, Wisconsin Brick Co., Madison, Wis.; R. C. Kiser, Crume Brick Co., Dayton, Ohio.

Status of the Industry

John L. Jackson, president of the association, in his opening address said: "There is a certain class of men whose medium of expression is conversation, which means fundamentally that other people are necessary to their well being. They are to be met holding forth in clubs, in all seats of government, in business and in many homes, where for the most part they indulge not in argument but in positive utterances. Then there is the other sort, whether from envy or biological difference in makeup, it is customary to refer to them by a somewhat vulgar and not deserved term. Their own expression takes the form of action as though obsessed by uneasy conscience. They are unable to remain comfortably seated over a given length of time. Their salvation lies in doing things; and unquestionably they do a larger part in getting the world's work done, but are not held in such repute as their more fluent brothers. I sometimes think the most of our numbers belong to the first order or class. They do a lot of fault finding both in what others are doing to them and what your officers should have done. There are a few of the second order who offer and do their share willingly when and if called upon. They are so few that I am reluctant to call on them all the time. If both classes would cooperate or work together it would not have made the work so hard for your officers, and sometimes leave the most important part undone.

"When I consented to act as your president in 1926 we had on hand $10.03, and again $526.12 in 1927; $1046.06 in 1928, and now our books show a balance of $1286.59 with a few dues still to collect. I would have preferred to show a deficit for the purpose of promoting and advertising our product, as was recommended in my message last year, when our members would have received more returns.

"In 1926 we had a membership of 38. Since then we have lost by resignation and non-payment of dues nine, and have succeeded in getting 12 members, giving us a total membership of 43, with a much larger production and better product than was being made at the time I took my office. I am in hopes that we will be able to show progress in the standardization of our product. A simplified line made according to a commercial standard for size, grade and quality, certified and approved, backed by national use and advertising, represents a maximum of practical protection to the consumer and a reliable source of profit and good will to the manufacturer, distributors and users. As it looks to me now something will have to be done soon to protect our product.

"*The Architectural Forum,* January, 1929, has this to say, 'In January, 1928, we advanced the theory that the several preceding years of great building activity did not represent a 'boom period,' but only that the country and the building industry had arrived at a relatively new normal, augmented by a growing population: The desire for better housing and better buildings for commerce, and industry, and by the ability to pay for these facilities. The actual contract record for 1928, according to the F. W. Dodge Corp., was approximately 5% ahead of the total for the year 1927 and 4% in excess of the total for 1926. These figures include not only building construction, but also engineering work and a considerable part of the volume reported in to be found in the public works and utilities classification. On the other hand the actual building construction has continued in such a volume for five years now, that it seems absolutely necessary to discard the 'boom period' and to accept the new normal, while every condition points to a continuation of building activity and perhaps the exceeding of all past records to the amount of 4% to 6% for the year 1929.

"I am interested in three companies all of which made a good showing last year. They have their equipment as well as organization in condition to do better for this year, and I have given the stockholders, at their annual meetings, to understand that we will do equally as well as we have in the last two years.

"Last year in April I gave a talk at Detroit, Mich., to the Building Officials' Conference of America, telling them about our product and how it was made, by showing them a moving picture, as well as referring them to buildings in and about Detroit. They were very much interested in this, and I believe took advantage of visiting a great many of the buildings. I am in hopes of repeating my talk at the next annual meeting of the American Society for Testing Materials, and several other associations where our product is unknown, and should be brought to the attention of the members. I am a believer that as the industry goes so goes the individual manufacturer."

Traffic Matters

J. Morley Zander, Northern Indiana Brick Co., as chairman of the traffic committee, reported the results of a long drawn out traffic controversy in which an examiner for the Interstate Commerce Commission has recommended that sand-lime brick be placed in the same classification as common brick. The case was brought by the Northern Indiana Brick Co., Mishawaka, Ind., as a result of discrimination on the part of the railroads in favor of clay brick. This case will have national significance to the sand-lime brick industry.

Depreciation

John A. Grimes, Bureau of Internal Revenue, Treasury Department, Washington, D. C., made a plea for the establishment by the industry of uniform depreciation scales on principal pieces of machinery and equipment, in order to avoid disputes in the filing of income and profit tax returns. He said about 70 national associations had adopted such scales, and the saving in disputes and litigation amounted to many millions of dollars, both to the industries concerned and

to the government. He described the method of getting up such a scale and of its adoption.

Wall Backing Units of Sand-Lime and Vibrated Concrete

W. H. Crume, Crume Brick Co., Dayton, Ohio, described a by-product, or rather an auxiliary product, his company is now producing, as follows:

"In 1926 at the New Orleans convention I offered a paper on 'Manufacture of Light-Weight Title,' and in this paper stated that we had been experimenting with various combinations of materials with both lime and cement as a binder, using several different types of equipment, designed primarily for concrete products. These machines included a tamping machine, a Duntile machine and an automatic hydraulic press.

"In 1928, at the convention held in Washington, I presented a paper dealing with further experimental work, done during 1926 and 1927, trying to develop satisfactory hollow building units and solid type, double brick.

"The solid, double brick of our regular sand-lime mix we have had in production since the last convention, and they are proving a satisfactory unit to the trade. They did not move very well during the first half of last year, but during the past six months a better demand has been created, so that while our production was not large, we sold and delivered 1,500,000, equal in wall volume, and money value to 3,000,000 common size brick. A large percentage of this double brick business would have gone to competitors if we had not been able to offer this size. We anticipate at least doubling our double brick sales during the present year. Competition with hollow tile, especially the 5x3¾x12-in. size or back-up tile as they are called in our market, was keener during the past year than in any previous year in our twenty years of manufacturing brick. The reason for this was due to changed conditions in the Ohio market. A little more than a year ago the state commission regulating the state building code modified that part of the code specifying the use of solid brick in the walls of many types of buildings, so as to allow the use of hollow building units, where only solid brick construction had been allowed before.

"The average 5x3¾x12-in. clay tile used in this market weighs about 9 lb., and in wall volume equals three standard size brick and mortar joints. These tile sell for a little less than three brick and there is some saving there, but the big saving to the contractor is on labor. I do not know the exact figures, but would estimate that a bricklayer can lay up 1000, 5x3¾x12-in. back-up tile in the time it would take him to lay up 2500 standard brick, or a saving of the labor and mortar cost of 500 standard size brick. This figure may be a trifle high, but will serve as an illustration.

"The cold hard fact is, that in practically every case where the contractor is permitted to use the hollow tile in place of brick, he does so.

"To meet this situation, we redoubled our efforts to produce a hollow tile. We made countless runs of all kinds of material on our hydraulic press machine and made some satisfactory tile so far as the machine was concerned, but the cost of cast-iron pallets and the difficulty of handling the green, freshly formed tile without excessive breakage presented a very difficult problem; and the labor costs of making and handling seemed to be entirely too high.

"In March of last year I attended the convention of the National Concrete Products Association, and American Concrete Institute at Philadelphia, to get in touch with other producers of concrete products, hoping to get some information as to methods of handling, curing, etc. I found that practically all the producers there made only the large 8x8x16-in. concrete blocks and gained very little information of value to us in solving our problems.

"There were several exhibits in conjunction with the conventions, and I became very much interested in one, that of the MacGlashan Supertile Co., of Tecumseh, Mich. Its product was so unusual and seemed to offer so many economies in both production and handling, that on my return to Dayton, I decided to visit their experimental plant at Tecumseh. Mr. Kiser and I spent a couple days there and arranged for some equipment to be shipped us. The equipment consisted of 100 pallets or gang molds, one-half 5x3¾x12-in. and one-half 5x8x12-in.

High Pressure Steam Curing

"We immediately constructed three atmospheric steam curing tunnels at considerable expense and equipped them with heating and live steam pipes, and we also installed a 66-ft. hardening cylinder in our tile plant. It was our intention to make up one hundred pallets of 'Supertile,' putting them in the atmospheric steam curing chambers for about three hours and then removing them from the molds, stacking them on sand-lime brick trucks and placing them in the hardening cylinder to complete the curing, which I had found by experimenting could be done satisfactorily, though high pressure steaming is considered bad practice by most, if not all authorities on the manufacture of concrete products.

"I will describe briefly the 'Supertile' equipment and process. A wet mixture of sand, gravel and cement with as much as ½-in. slump is dropped on to a pallet or gang mold, this mold having spaces for twelve 5x8x12-in. or twenty-four 5x3¾x12-in. tile, the pallet having hinged division plates and hinged sides locked together. The pallet rests on a core bed that is carried by a tram car that moves the mold under the charging hopper, and the arms of the tram car are then lowered by a winch arrangement until the arms and their load rest lightly on the vibrating mechanism. The vibrator is then set in motion at a speed of 3000 to 3600 r.p.m., and the mix is moved evenly over the pallets by a sort of hoe arrangement and then the excess material is struck off to a table surrounding the pallet. The table is then raised and the tram is moved away from under the charging hopper and the pallet lifted off the core bed; in our case by electric hoists, and the pallet is then set on a tram car; in our case our regular brick tram cars. The tile are then ready for curing after which they are removed from the pallets.

"By experimenting we found that we could run the filled pallets directly into the hardening cylinder without going into the atmospheric steam curing chambers, eliminating any handling of the tile until the pallets removed from the hardening cylinder and tiles removed from pallets were ready to place in the wall, just as in sand-lime brick practice.

"Of course, our method means at least three times the equipment of pallets originally contemplated, as we think we will be able to manufacture about 8000, 5x3¾x12-in. tile on one vibrator in a 10-hour day, and this takes more than 300 pallets. We contemplate, so does also the MacGlashen Supertile Co., some improvements to speed up production, by eliminating some of the minor operations now necessary.

"The results obtained with this equipment by varying the mixtures of aggregate and cement, and water, are surprising and unusual. Our interest in 'Supertile' was originally stimulated by the beautiful texture obtained, similar to a travertine.

"Early last fall I sold an order of 200,000 5x3¾x12-in. tile for a high school job. At the time our tile were very heavy and tested about 1700 lb. per sq. in. gross area, whereas the building code called for only 700 lb. We had the Supertile company re-designed pallets for this size, but until they arrived we had to deliver the heavy 13-lb. tile, and they were so much heavier than clay tile, that the contracting company protested. On the arrival of the re-designed pallets, we cut the weight to about 11 lb. to 11¾ lb., but we were not satisfied, and by continual experimenting cut this down to about 10½ lb.; but the tile had a rough surface and were darker than the denser tile. We delivered some of these rough tile, and more or less to our surprise they pleased the architect's superintendent so much that he ordered that nothing but the rough surface tile should be delivered on the job, and that type is now our standard for all interior and back-up tile.

"We average about 100 of these 5x3¾x12-in. tile to a sack of cement and expect to increase this number with better mixing and handling of the raw materials.

"We have done continuous experimental

work, but only a few of the results can be recorded here.

Light-Weight Tile

"In addition to the tile made from sand and gravel as aggregates we have experimented with 'Haydite' and water granulated slag and cinders for making light-weight tile. We have been successful in making 'Haydite' tile with the 'Supertile' equipment, but the slag gives unusual and unexpected results, due probably to its extremely light weight and lack of strength. Our experience has led us to the conclusion that two types of tile should be made, common or back-up tile in the various sizes with rough surface, as this is ideal for such use giving a plaster or stucco base, equal to cinder and 'Haydite' block and tile, and with a weight that is not excessive, and further I have been able to nail into certain types of our 'Supertile' made from gravel and sand aggregate; consequently these tile have all the good qualities of the cinder block, without the injurious impurities which cause corrosion to nails, iron pipe, etc., that come into contact with them. You get much better production of the rough tile per sack of cement than the smooth, our average over a period being 103, 5x3¾x12-in. per each sack, and this I am confident can be raised to 110 per sack, whereas with the smooth dense tile about 70 to 80 tile per sack is the result.

"The smooth dense tile can be made up as facing tile, where they are to be used without being plastered or stuccoed on, and it is a very simple matter to change from rough to smooth, or vice versa; usually only a change in the water content in necessary, the same proportion of sand, gravel and cement being used.

"The manufacture of vibrated supertile as we have developed it at our plant, seems to be especially adapted to sand-lime brick plants, as much of their equipment can be used to advantage. To make the rough tile, it is necessary to have gravel or crushed stone, as well as sand, and it is also advisable to use a considerable proportion of coarse aggregate as it takes less cement per unit.

"By curing these tile somewhat similar to the method used in curing sand-lime brick a finished product is ready for the market on removing from the hardening cylinders, and as the pallets with the green tile in them can be moved on tram cars without damage to them, due to the bottom of the pallet carrying the web of the tile, and the division plates holding up the sides of the tile and preventing slumping, a satisfactory result is obtained that I believe can only be accomplished by this method of manufacturing concrete tile and block, as you cannot get the high strengths or the quantity of tile per sack of cement with any of the dry tamp or dry pressure machines, and handling green 'Supertile' causes practically no breakage as the product at this stage has a consistency like a stiff jelly and moving over tracks, transfers, etc., while necessarily jarring somewhat, does not crack or rupture the unit as it does those made by other processes of dryer material.

"We expect to make and cure 8000 of the 5x3¾x12-in. units per 10-hour day, using two 70-ft. hardening cylinders, as each cylinder will hold about 4000 tile in the pallets, this is a wall volume of more than 24,000 brick, and in case an increased capacity is needed we expect to run two shifts to double the output. The condensed steam from the hardening cylinders is not returned to our boiler due to the large amount of oil or grease running off the pallets, which are dipped in a bath of oil or grease before being filled. We expect to recover a large part of the oil or grease carried with the condensation for re-use on the pallets.

"We do not have data covering costs at present, but I believe with what we have, we can at least approximate what costs should be after some of the improvements in handling are installed.

"While we have produced 'Supertile' in marketable quantities, our tile plant is more or less a makeshift so far as mixing and conveying to the 'Supertile' vibrating machine, and we are planning overhead aggregate bins where the stone and sand will be separate and accurate batching hoppers will deliver the predetermined proportions of each material to the mixer and with a water meter to regulate exact quantities of water we will have much better control of our mixes.

"Also as we expect to locate the mixer immediately above the vibrating machine hopper, there will be no separation of coarse and fine material as is the case when the mixed materials are conveyed by elevators and conveyors.

"In this paper I have tried to show the possibilities of vibrated concrete products, and hope we will have our tile plant in efficient economical operation within the next few months when we will be pleased to have any or all of the members of the association visit our plant and see what we are accomplishing."

Lime

D. M. Gray, Louisville Cement Co., Louisville, Ky., described the manufacture of lime. In hydrating lime he emphasized the necessity of the correct amount of water, and most thorough mixing of lime and water. He further emphasized the fact that progressive lime manufacturers now maintain laboratories and chemists to help solve consumers' problems, and he invited sand-lime brick manufacturers to put their problems up to his company. The discussion brought out the point that plasticity is one of the most desirable properties of lime for sand-lime brick manufacture.

H. H. Lemon, superintendent of the Louisville Cement Co.'s lime plants, supplemented the discussion by stating, as his opinion, that plasticity is entirely the result of proper burning of lime.

Bruce C. Matson, Beachville White Lime Co., Beachville, Ont., at a later session, presented a paper on lime manufacture, which covered the ground very thoroughly.

Bureau of Standards Meeting

In welcoming the members of the association to the Bureau of Standards, ***Dr. George K. Burgess,*** director of the bureau, emphasized the desirability of standardization. He also described briefly the various activities of the bureau. ***S. H. Ingberg,*** of the fire resistance section of the bureau, described with motion pictures, the methods and equipment for making fire-resisting tests of building materials and equipment. ***Warren E. Emley,*** chief of the organic and fibrous materials division, described the manufacture of wall-board from corn-stalk waste. ***I. J. Fairchild,*** of the Department of Commerce, spoke on progress of standardization and simplified practice in industries in general. ***J. A. Murray,*** of the division of clay products, etc., of the bureau, spoke informally on results of tests on sand-lime brick.

Legislation and Business

John C. Gall, associated with James A. Emery, general counsel, National Association of Manufacturers, Washington, D. C., gave a splendid summary of the work of our national law-making mills, and how legislation vitally affecting business is likely to get by, unbeknown to the average business man.

New Rotary Brick Press

L. Haigh, W. A. Riddell Co., Bucyrus, Ohio, described a new press his company has designed and patented to make refractory silica or ganister brick, replacing a time-honored, hand process. This new press is capable of a pressure of 7500-lb. per sq. in. A special feature is that the upper pressure plate is movable and fits into the mold. The press was built for the Harbison Walker Refractory Co., Pittsburgh, Penn.

Northern Indiana Brick Co.'s New Plant

Wm. F. C. Dall, manager, described the new plant of the Northern Indiana Brick Co., at Mishawaka, Ind., as follows:

"The company was fortunate in securing a site of 27 acres of level land, underlaid to a depth of over 60 ft. with sand suitable for brick. The water level is about 20 ft. below the surface. There is no overburden but about a foot of top soil is removed. A small drag line does the digging and delivers the sand to an elevating belt conveyor, which in turn discharges to a vibrating screen on top of the sand hopper.

"The screen and conveyor can be stopped and started from the sand-drag, hoist house as well as from the upper or discharge end.

A centrifugal pump taking water from a series of well-points in the bottom of the sand pit, holds the water about 3 ft. lower than the natural water level of the ground. All of this equipment is in charge of and operated by one man; and this provides all sand, screened and delivered into the sand bin to make the day's output. Sacked hydrated lime is received in box cars and unloaded into a warehouse or the sacks are taken from the box car, opened and dumped into a bucket elevator, which discharges to a screw conveyor, then into a steel bin holding 20 tons.

"The elevator, conveyor and bin are all enclosed and tightly covered to prevent dust. This lime handling equipment can be stopped and started from either end. The mill for mixing and grinding is in an open-pit or basement, and the 'volumeters' taking lime and sand from the bins are on the general factory floor level immediately over and discharging directly into the mill.

"The mixed material from the mill is discharged right on an inclined belt conveyor that carries it to the top of the material hopper. On the way this material passes under a magnetic pulley to catch stray iron. The material is fed from the hopper to the press as required.

"The hopper has an individual-motor-drive control from a push button on the press, easily reached by the press operators. The press is a Jackson and Church electric drive, and is likewise stopped and started with a push button.

"The press is not placed square with the center line of the factory, but is at an angle of about 45 deg. This is done for the purpose of making the picking of the brick easier. One factory car only is placed at the press on a transfer car. The transfer car holds an empty also, which can be brought up to the press at the same time that the loaded car is moved away from it. In operation the loaded car is moved sideways away from the press and the empty brought up so quickly that no brick are lost in making the change. This transfer is operated electrically and controlled by a push button and automatic stop.

"The kettles are 84 ft. long with heads on both ends and with a slight down grade through them. Each kettle holds approximately 30,000 brick, which are produced in about nine hours. The brick are pulled out of the lower end of the kettles directly into the piling yard where they can be piled for storage, loaded on the trucks or railroad cars. In loading railroad cars the factory cars are turned on a turn table and run into the railroad cars for unloading.

"This plant produced 1,200,000 brick in the month of July and 1,250,000 in the month of August, 1928. It has but one press and during those two months the press was operated 19 hours a day for five days and ten hours on Saturday. The crew for single shift consists of superintendent and ten men, who do all of the work from getting in of sand and lime, firing the boiler to taking care of brick handled in the yard. When the factory was run day and night seven additional men were employed.

"There were really no new solutions of the problems of making sand-lime brick worked out in this factory, but owing to its ease of operation it is producing brick at a minimum expense for a one-press plant."

Registration

Acme Brick Co., Milwaukee, Wis.: I. G. Toepfer.
American Brick Co., Boston, Mass.: C. H. Carmichael.
Boice Bros., Pontiac, Mich.: E. C. Boice.
Crume Brick Co., Dayton, Ohio: W. H. Crume, J. R. Kauffman, R. C. Kiser.
Grande Brick Co., Grand Rapids, Mich.: T. A. King, G. H. Nichols.
Harbour Brick Co., Toronto, Ont., Canada: A. S. Robertson.
Hummelstown Brownstone Co., Hummelstown, Penn.: A. K. Walton, A. G. Walton.
Jackson and Church Co., Saginaw, Mich.: J. W. Van Brunt.
Jackson Brick Co., Jackson, Mich.: A. H. Clark.
Louisville Cement Co., Louisville, Ky.: D. M. Gray, H. H. Lemon, W. F. Irwin, Jr.
Marble Cliff Quarries Co., Columbus, Ohio: E. C. Powers.
Michigan Pressed Brick Co., Detroit, Mich.: J. Finkbeiner.
National Brick Co., Washington, D. C.: C. C. Dailey, Dr. A. S. Wolfe.
National Brick Corp., Long Island City, N. Y.: H. J. Levine, William Walzer.
National Lime Association, Washington, D. C.: W. V. Brumbaugh.
Northern Indiana Brick Co., Mishawaka, Ind.: Wm. F. C. Dall.
Paragon Brick Co., South River, N. J.: W. T Modes.
Rock Products, Chicago, Ill.: Nathan C. Rockwood.
Rochester Sand and Brick Co., Detroit, Mich.: J. G. Schluchter, A. A. Dickinson.
Saginaw Brick Co., Saginaw, Mich.: J. L. Jackson, J. M. Zander, Conrad Fern.
Sand Lime Products Co., Detroit, Mich.: T. C. Taylor.
United States Bureau of Standards, Washington, D. C.: J. A. Murray.
Winchester Brick Co., Winchester, Mass.: J. J Gallagher.

Consolidated Feldspar Corp. Organized to Consolidate Many Feldspar Companies

A CONSOLIDATION of many of the important feldspar operators over a widespread area of the country has recently been effected, and the new concern, which will be known as the Consolidated Feldspar Corp., is understood to have total assets amounting to approximately $8,000,000. The new corporation has been chartered under the laws of Delaware, with a stated capitalization of $5,000,000, which is made up of 50,000 shares of $7 cumulative preferred stock, and 300,000 shares of common stock, all without par value. The companies included in the merger are the Golding Sons Co., Trenton, N. J., the Erwin Feldspar Co. of Spruce Pine, N. C., the Dominion Feldpar Co. of Canada and New York, the Maine Feldspar Co. of Brunswick, Me., the Isco-Bautz Co., Inc., of Murphysboro, Ill., Feldspar Quarries, Ltd., of Canada and Norman G. Smith Co., of Spruce Pine, N. C. It is possible that one or two more companies may enter the consolidation at a later date.

The president of the new company will be Herbert P. Margerum, who has been president of the Golding company for some years past. Norman G. Smith, who has been president of the Maine Feldspar Co., and Robert W. Lawson, formerly vice-president of the Erwin company, will be the vice-presidents of the new organization.

The purpose of the consolidation is to form a well-rounded feldspar company, which will include both ample supplies of raw material and adequate milling facilities in each of the major fields of operation in North Carolina, New England, Canada and the west. This will make it possible for the consuming trade to secure a dependable quality of all the different grades of feldspar from a single company which has never before been possible, but which appears to be so essential to the ceramic industry. The possibility of securing feldspar from large deposits of proven quality produced and milled by men of wide experience in the industry, is an advantage long hoped for by consumers, who realize the great importance of a steady supply of uniform feldspar.

This consolidation was worked out and consummated by A. J. Fink of Baltimore who handled the successful merger of the eastern silica sand interests in 1927. He has been working on this consolidation for more than a year and a half, and has made a thorough and careful analysis of the entire industry during that time. He will be chairman of the board of directors of the new organization. Beside this new work he is a director of the Baltimore Commercial Bank, chairman of the board of directors of the Southern Hotel Co. of Baltimore, chairman of the board of directors of the Pennsylvania Glass Sand Corp., president of the Investment Corporation of Maryland, and is identified with a number of other business and financial interests.

Trade Practice Rule On Prices Rescinded

THE Federal Trade Commission has reconsidered and rescinded its action of June 29, 1928, in receiving a rule of the trade practice conference of the millwork industry regarding "Distribution of Price Lists," the commission announced February 5 in a statement which follows:

"The commission has directed that notice be sent to the industry advising that the rule has been rescinded, and that the commission in the present state of the law cannot receive a resolution of the industry for the circulation of prices which is not confined to past transactions.

"The rule in question, Rule 12 of Group II, of the millwork industry resolutions, reads:

"'The industry hereby records its approval of the practice of distributing and circulating to the entire industry current price lists and all notices of advance or decline in prices made by any individual distributor or manufacturer, either by the individual distributor or manufacturer or by the association or group he may be identified with.'"

Foreign Abstracts and Patent Review

Introduction to Colloid Chemistry. Th. Graham suggested about 1861 the term "colloid" in contrast to the universally known "crystals," which is derived from the Latin word "collum" (lime), as the typical representative of this class of substances; accordingly, the "crystal" substances precipitate from solutions as crystal forms, as, for example, table salt, sugar, etc., and the "colloidal" substances precipitate without shape, or amorphous, as, for example, lime. But crystals may be secured from colloidal solutions; or substances may appear crystalloid with one solvent and colloid with another solvent. The aqueous solutions of colloids are called "hydrosol," and if other solvents are used it may be alcosol, aetherosol, etc. By evaporating the solvent, a residue, the "gel" is obtained, which may be called hydrogel, alcogel, etc., according to the solvent used. Under certain conditions the gel remains soluble, and by addition of suitable salts the gel may be "flaked" from the sol and made visible and may be observed through a microscope with illumination from the side. The colloids represent a "disperse phase," according to Wo. Ostwald, and are dispersed in the dispersent. There are two main groups in the chemistry of colloids, the disperse phase of the first group being the "colloid suspensions" or lyophobous colloids (objecting to dissolvency) and the "lyophilous" colloids, which are favorable to dissolving, and, in respect to water as the dissolvent, may be called hydrophilous. By adding certain crystalloid or colloid auxiliary substances, colloids may be entered into solution but cannot be removed; this is "peptisation." There are also "protecting colloids" which prevent the coagulation of the colloids and aid often in preventing highly concentrated lyes; these protecting colloids are therefore also called "stabilizers."—*Tonindustrie-Zeitung* (1928), **52**, 67, pp. 1368-1369.

Concerning the Question of Production of Clay and Lime Mixtures. The investigations of Peter P. Budnikoff of the Technological Institute, Charkow, Russia, show that by aid of clays of a certain chemical composition under certain physical conditions it is possible to produce a rather firm clay-lime-stone cementitious material without burning, which is comparatively strong and which cannot be washed to pieces in water. It is well known that not every desirable quantity of base acts favorably upon the plasticity of a mass of clay. A very great influence is effected here by the absence of those substances which form in the clay during its ripening. That quantity of base which exceeds the most favorable only by a little, causes a hardening of the mass; and by a further increase in the quantity of base a softening starts in; however, under decrease of plasticity. These occurrences may be easily explained from the standpoint of colloidal chemistry. The stabilizing ions would be found in very small quantities in the colloidal system; but the colloid is coagulated by their excess. The hardening of the mass could be explained in this manner by a coagulating action of the excess of bases. There are "decomposition" products in the mass of clay, humous substances, which represent lyophilous colloids; therefore the clay batter can be considered as a system from a suspension colloid which is protected by a lyophilous colloid. If the liquefication and the consequent rehardening of the mass of clay is to be viewed as a peptisation and a coagulation of the clay suspension, then its plastic condition is unconditionally dependent upon the content of protecting lyophilous colloids, which envelop the particles of clay and paste them together to a but little movable mass; they disperse later and the mass acquires gradually a greater mobility. By an increase in bases the protecting colloid is destroyed; the colloid passes over into a genuine soluble condition, whereby the plasticity of the mass suffers.

In the study of the question of the presentation of raw clay which cannot be washed to pieces in water, the author has studied the influences of a number of neutral and acid-uous salts, of acids and bases upon various kinds of clays under different circumstances. In these tests, plates of 4.5x1.5x1.2 cm. dimension were prepared from the clay and later dried at room temperature; the dried-out plates were later placed in a glass containing 200 cu. cm. of water. Caustic lime proved thereby to be a very characteristic reagent. In this case it was observed that with an increase in the percentage of $Ca(OH)_2$ the ability to wash the clay to pieces with water increased at first and then decreased, and that finally it could not be washed to pieces at all. First a sample of red clay was tested. When 5% $Ca(OH)_2$ of the dry clay weight was added hardening set in, which can be explained through the coagulating influence of the base upon the colloidal substance of the clay. In another clay the resistance to being washed to pieces in water set in at 6% addition of $Ca(OH)_2$; however, this product receives only a low mechanical strength under influence of water. But if the clay samples are hardened with steam pressure similarly as sand-lime brick, a stone of various strengths, according to the kind of clay and quantity, addition of lime, the pressure and the period of steaming, may be formed. Samples of three different clays were prepared with addition of milk of lime, or portland cement or other materials giving off lime, also asbestos, phosphoric acid, sulphuric acid, which gave the clay an absolute resistance against water wash, the samples of 5x5x5-cm. size having been dried 3 days in ordinary temperatures and then hardened under 4 to 12 atmospheres (59 to 175 lb.) pressure for 6 hours, 10 atmosphere (147 lb.) being the most favorable pressure, when the compressive strength was as follows:

Addition	Compressive strength kg./sq.cm.	lb./sq.in.
6% CaO	81	1152
8% CaO	90	1280
10% CaO	108	1536
4% CaO plus 4% portland cement	82	1166
5% asbestos of loose fiber plus 8% CaO	68	967
10% portland cement	10	142

The composition of this yellow clay was as follows: SiO_2, 57.38%; Al_2O_3, 24.58%; Fe_2O_3, 6.70%; CaO, 1.50%; MgO, 0.60%; glow loss, 7.55%. In testing this yellow clay at 10 atmospheres pressure for different periods, the 8-hour period was found most favorable, when the following figures were secured:

Addition	Compressive strength kg./sq.cm.	lb./sq.in.
6% CaO	88	1252
8% CaO	104	1479
10% CaO	128	1841
4% CaO plus 4% portland cement	93	1323
5% asbestos plus 8% CaO	64	910

In testing other samples of clay, one reached a compressive strength of 135 kg. per sq. cm. (1920 lb. per sq. in.) at 8 to 10 atmospheres (118 to 147 lb.) steam pressure. Kaolins and highly fireproof clays largely gave no good results. The addition of acids in place of lime to the clays leads to no positive results.—*Tonindustrie-Zeitung* (1928), **52**, 67, pp. 1369-1370.

Destruction of Concrete By Carbonic Acid. Dr. Karl Biehl of the Wicking Institute for Cement and Concrete Research, Lengerich i. Westf., described the testing of waters in the vicinity of a concrete sewer that had been destroyed by aggressive solutions, by the phenolphthalein reaction method, in which it was found that the various waters contained greater or lesser quantities of carbonic acid corresponding to pH values or hydrogen ion concentrations of 1 to 13, or n/10 to n/10,000,000 to n/10 respectively, in which pH 7 is neutral, pH 1 to 6 aciduous and pH 8 to 13 alkaline, and that of these waters those passing through the sewer had values greater than pH 7 and did not affect the concrete, while those seeping towards the sewer had values less than pH 7 and affected the concrete. The phenolphthalein reaction method is shown as applicable for determining the degree of danger of carbonic acid in waters, and it is suggested as a simple method for determin-

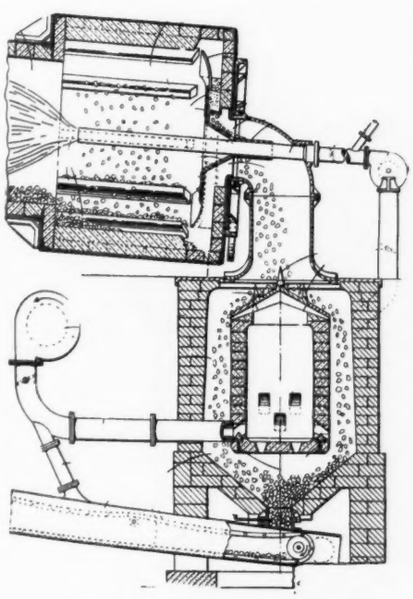
ing the extent of aggressiveness of other solutions detrimental to concrete. A bibliography on the subject is appended.—*Beton und Eisen* (1928), **27,** 18, pp. 371-373.

Observations Concerning Shrinkage in Concrete. According to the investigations of T. Cocague and G. Matras the chances of shrinkage are decreased to the lowest possible degree, if a minimum possible amount of mixing water is used, and care is taken for abundant wetting during the hardening period. It is further recommended to work with mixtures that are not too rich. Sharp-edged and many-edged aggregates have proved to be effective in reducing shrinkage. The addition of sodium silicate solutions reduces shinkage, whereas calcium chloride increases the shrinkage.—*Le Ciment* No. 6 (1928), pp. 232-236.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Rotary Kiln and Furnace. The patentee describes a method of preheating air in kilns for combustion of powdered or liquid fuels by passage of the air through a series of passageways over which the hot clinker cascades. The first contact the hot clinker makes with the air is in the kiln itself, and here the clinker is picked up by a series of baffles which elevate and then drop the material, allowing the air to pass through and absorb some of the clinker's heat. The clinker is then picked up by a second set of baffles or scoops which deliver the hot material to a position where it drops over a "recuperator." The recuperator is a chamber through which combustion air first is received into the system and the passage of the air through this pipe-like flue is given a preliminary heat before passing up and into the end of the kiln for further heating as described above. The clinker after passing over the recuperator falls to a hopper that serves a pan conveyor. The combustion air can, if desired, be first passed over the clinker in the conveyor by a fan. This same fan delivers the air to the recuperator. The air used for atomizing the fuel is drawn from the recuperator by a second fan.—*John Henry Bentley,* October 30, 1928. U. S. Patent No. 1,690,048.



A method of preheating air

Wallboard With Durable Edges. The purpose of the invention is to have a gypsum wallboard with a strong and durable edge that will not split or crack when nailed, and to fulfill this purpose the inventor describes the use of a U-shaped (12) member that clamps over the edge of the gypsum filler and so placed as to later be covered by the paper which goes to make up the face of the board. The top and bottom paper is preferably made wider than the board, and the edges further reinforced by lapping the lower paper over the upper at the edges, as shown in the illustration. If desirable, however, paper can be used that is narrower than the board, and can be spliced by gluing a strip at the abutted edges on the under side of the paper so that the resulting splice will be buried in the plaster matrix.—*William M. Jenkins,* November 6, 1928. U. S. Patent No. 1,690,229.

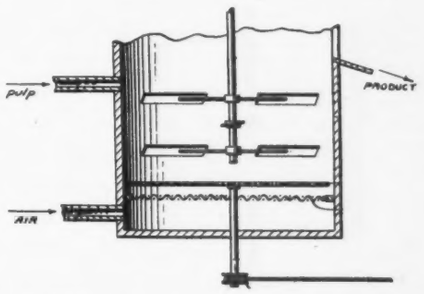
Wallboard reinforced at edge

Process for Recovery of Potassium Chloride from Kiln Dusts. The invention relates to the recovery of potassium chloride from materials containing chlorides and sulphates of potassium from cement kiln dusts.

The dusts are leached with water at superatmospheric temperatures so that all the soluble portions go into solution and the concentration of each substance is increased up to a certain point. Further leaching increases the concentration of KCl and K_2SO_4, resulting in a solution of high potassium content. When the solution is filtered and the filtrate cooled materially below the leaching temperature, the solubility of the KCl decreases and that of Na_2SO_4 remains practically constant, so that the resulting precipitate has a high potassium content.

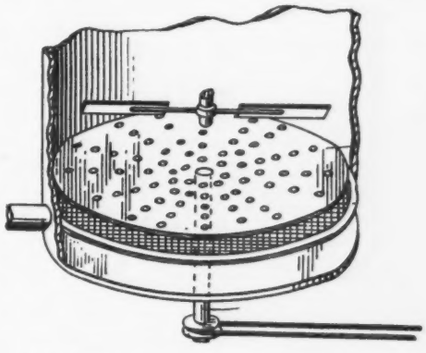
As an example of one particular method of carrying out this process a 600-gram sample of cement kiln dust was leached at boiling temperature with 1400 c.c. of brine or mother liquor resulting from a preceding leaching and potassium chloride crystallization. This dust was taken from a batch which was found to contain 80.39% water soluble material, and this water soluble material had approximately the following composition: K_2O, 20.8%; Cl, 37.5%; SO_3, 14.9%; undetermined, 26.8%. A total of 80 gm. of salt was obtained, which contained 47.7% Cl, 62.9% K_2O, and 0.3% SO_3, or substantially a pure KCl.—*Norman M. McGrane, assignor to International Precipitation Co.* U. S. Patent No. 1,688,873.

Cellular Cementitious Materials. The patent covers a method of producing air bubbles by a suitable frothing agent and adding the foam so formed to a cement sludge. The method also includes aerating a pulp of cement material by air or mechanical means, or both, with the addition of a small amount of oil or frothing agent, as is the practice in flotation of sulphide or similar ores.



Mechanical agitator for assisting in the production of small air bubbles

The invention does not restrict itself to any particular type of apparatus, but claims as new the idea that if an air stream is subdivided at the point of entrance to the pulp by felts or other methods, and at that point the air is further cut by mechanical means, bubbles of such small size are produced that the application is practicable for cellular cement production.—*George B. Hinton,* October 9, 1928. U. S. Patent No. 1,687,067.



Air bubbles are formed by this apparatus for making cellular products

Lime Plaster Substitute from Carbide Waste. The process consists of treating carbide waste sludge materials with calcium chloride and heating to boiling temperatures. This causes reaction whereby undesirable impurities are driven off and the liquor remaining separates into a plurality of strata and the desired material can be separated. The patentee's claim that the material so produced will be of uniform color and composition.—*Douglas M. Harrison assignor to McKenzie Mortar Co.* U. S. Patent No. 1,688,542.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended Jan. 12	Limestone Flux Week ended Jan. 19	Sand, Stone and Gravel Week ended Jan. 12	Sand, Stone and Gravel Week ended Jan. 19
Eastern	1,867	1,918	1,630	1,451
Allegheny	2,681	2,519	1,726	1,567
Pocahontas	95	90	254	277
Southern	428	408	6,716	6,224
Northwestern	450	510	546	554
Central Western	426	491	5,092	4,608
Southwestern	408	389	3,994	4,286
Total	6,355	6,325	19,958	18,967

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1928 AND 1929

District	Limestone Flux 1928 Period to date Jan. 21	Limestone Flux 1929 Period to date Jan. 19	Sand, Gravel and Stone 1928 Period to date Jan. 21	Sand, Gravel and Stone 1929 Period to date Jan. 19
Eastern	4,832	5,856	5,416	5,010
Allegheny	7,585	7,735	5,811	5,331
Pocahontas	731	278	915	860
Southern	1,464	1,303	24,194	18,738
Northwestern	1,566	1,453	2,719	1,830
Central Western	1,057	1,233	14,062	13,922
Southwestern	1,209	1,159	11,012	12,479
Total	18,444	19,017	64,129	58,170

COMPARATIVE TOTAL LOADINGS, 1928 AND 1929

	1928	1929
Limestone flux	***18,444***	***19,017***
Sand, stone, gravel	***64,129***	***58,170***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning February 9:

SOUTHERN FREIGHT ASSOCIATION DOCKET

43868. **Stone, marble, calcite, limestone, slate or whitestone,** from L. & N. R. R., Knoxville and Atlanta division quarries and Brownson and Gantt's Quarry, Ala., to Medina, O. Combination rates now apply, and it is proposed to establish commodity rates on the articles in question from and to the points mentioned above, the same as applicable from the same origins to Akron, O. Statement of the proposed rates, with full commodity descriptions and minimum weight, will be furnished upon request.

43419, Amendment 1. **Ground or pulverized limestone or marble** from Cartersville, Ga., to Birmingham & Southeastern R. R. stations. Submittal 43419, included in Docket 451, for January 7 hearing, proposed rates on ground or pulverized limestone or marble, carloads (See Note 1), except when car is loaded to full visible capacity actual weight will apply, from Cartersville, Ga., to B. & S. E. R. R. stations. It is now proposed to amend this proposition to suggest the following through rates in lieu of those originally proposed, from Cartersville, Ga.: To Cotton Valley, Wilda and Liverpool, Ala., 221c; Wheatley, Wares Mill, Calebee, Conifer and Tuckabatchie, Ala., 217c; Tallassee, Bowens, Asberry and Eclectic, Ala., 221c per net ton.

43964. **Sand stone,** from Rockport, Ky., to Evansville, Ind. (when for beyond). Present rate, 140c per net ton; proposed rate (proportional) on sand stone, waste, crushed, not ground, carloads (See Note 2), from Rockport, Ky., to Evansville, Ind. (when destined to points north of the Ohio river), 105c per net ton.

44041. **Shale,** from Carbon Hill, Ala., to Memphis, Tenn. Lowest combination now applies. Proposed rate on shale, carloads (See Note 3), from Carbon Hill, Ala., to Memphis, Tenn., 135c per net ton, same as current rate on slag, carloads.

Note 1—Minimum weight marked capacity of car.
Note 2—Minimum weight 90% of marked capacity of car.
Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

SOUTHWESTERN FREIGHT BUREAU DOCKET

16704. **Agricultural limestone,** from Oklahoma points to points in Arkansas. To establish the following distance scale of rates on agricultural limestone, carloads, minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb. marked capacity will govern, from and to points shown below:

From Garnett, Price and Tulsa, Okla., and intermediate points to points in Arkansas on C. R. I. & P. Ry., Kansas City Southern Ry., Missouri Pacific R. R., St. L.-S. F. Ry.:

Miles	Rate Single Line	Rate Joint Line
5 and under	3	3½
10 and over 5	3	3½
15 and over 10	3	3½
20 and over 15	3	3½
25 and over 20	3½	4
30 and over 25	3½	4
35 and over 30	3½	4
40 and over 35	3½	4
45 and over 40	4	5
50 and over 45	4	5
55 and over 50	4	5
60 and over 55	4	5
65 and over 60	5	5½
70 and over 65	5	5½
75 and over 70	5	5½
80 and over 75	5	5½
85 and over 80	5½	6½
90 and over 85	5½	6½
95 and over 90	5½	6½
100 and over 95	5½	6½
105 and over 100	5½	7
110 and over 105	5½	7
115 and over 110	6½	7
120 and over 115	6½	7
125 and over 120	6½	7
130 and over 125	6½	7
135 and over 130	7	7
140 and over 135	7	7
145 and over 140	7	7
150 and over 145	7	7
160 and over 150	7	8
170 and over 160	7	8
180 and over 170	8	8½
190 and over 180	8	8½
200 and over 190	8	8½
210 and over 200	8	9
220 and over 210	8	9
230 and over 220	8½	10
240 and over 230	8½	10
250 and over 240	8½	10
260 and over 250	9	10
280 and over 260	10	10½
300 and over 280	10	10½
320 and over 300	10½	11
340 and over 320	10½	11
360 and over 340	11½	12
380 and over 360	11½	12
400 and over 380	11½	12
425 and over 400	12	12½
450 and over 425	12	12½
475 and over 450	13½	13½
500 and over 475	13½	13½
525 and over 500	14½	14½
550 and over 525	14½	14½
575 and over 550	15½	15½
600 and over 575	15½	15½

Shippers have requested a reasonable line of rates from Garnett, Price and Tulsa, Okla., and intermediate points. The scale proposed is the 9702 sand and gravel scale. The 9702 scale has been put in as specific rates from Oklahoma to southwest Missouri and northeast Arkansas points, and it is felt that the 9702 scale is proper for application between these points.

16723. **Chatt sand,** from points in Missouri to Heltonville, Ind. To establish a rate of $3.53 per ton of 2000 lb. on chatt sand, carloads, minimum weight 100,000 lb., from Alba, Atlas, Aurora, Carthage, Granby, Joplin, Neck City, Oronogo, Porto Rico, Prosperity, Purcell and Webb City-Carterville, Mo., to Heltonville, Ind. Shippers request the publication of the same rate to Heltonville, Ind., as currently applicable to Bedford, Ind.

WESTERN TRUNK LINE DOCKET

6784. Transit; storage at Sioux City, Ia. **Sand and gravel,** from Hawarden, Ia., to stations in Iowa and Nebraska. Present—Privilege not authorized. Proposed—To provide for storage in transit privilege on sand and gravel at Sioux City, Ia., when originating at Hawarden, Ia., and destined to stations in Iowa and Nebraska to which Sioux City is directly intermediate, subject to the through rate from point of origin to final destinations plus transit charge of $2 per car.

5787. **Sand,** carloads (See Note 2), but not less than 40,000 lb., from Duluth, Minn., and Superior, Wis., to stations on the C. & N. W. Ry., Sparta, Wis., to Winona, Wis., inclusive. Present rate, 10½c per 100 lb.; proposed, 10c per 100 lb.

ILLINOIS FREIGHT ASSOCIATION DOCKET

3718F. **Sand and gravel,** carloads (See Note 1), from Lincoln and Pekin, Ill., to C. S. & St. L. Ry. stations.

To	Pres.	Prop.
Waverly, Ill.	**	88
Hagaman, Ill.	**	94
Medora, Ill.	**	94
Jerseyville, Ill.	**	94
Lockhaven, Ill.	**	94

**No rates.

4893. **Sand, core,** carloads, from Greenwich, Kankakee, Van's Siding and West Kankakee, Ill., to various points in Illinois. Present rates, class.

To (representative points)	Present	Prop.
Gary, Ind.	Class Rate	100
Joliet, Ill.	" "	100
Elgin, Ill.	" "	139
Waukegan, Ill.	" "	139

4895. **Stone, broken, crushed or ground,** carloads, from Marblehead, Ill., to destinations in Wisconsin. Rates per net ton:

To (representative points)	Pres.	Prop.
Burlington, Wis.	$3.30	$2.14
Oconomowoc, Wis.	3.40	2.30
Whitewater, Wis.	3.30	2.14

4896. **Sand and gravel** (See Note 1), from Chillicothe, Ill., to Streator, Ill. Present rate, 75c; proposed, 65c.

4885. **Sand and gravel,** carloads, from Pekin, Ill., to Decatur, Ill. Present rate, 98c; proposed, 88c.

4883. **Sand, blast, engine, foundry, glass and molding** (See Note 1), from Bowes, Ill. Present rates, class; proposed, per net ton:

To	Prop.
Geneva, Batavia, Aurora, North Aurora and DeKalb, Ill.	$1.25
St. Louis, Mo.	2.14

4889. **Crushed stone,** carloads, from Buffalo and Linwood, Ia., to C. & I. M. Ry. stations, viz.: Auburn, Beechley, Pawnee Jct., Pawnee, Sicily, Humphrey, Kincaid, Callaway and Taylorville, Ill. Present rates, classification basis; proposed, $1.39.

4890. **Crushed stone, carloads** (See Note 1), from Krause and Stolle, Ill., to J. & H. R. R. stations between Jacksonville and Havana, Ill. Present rates, class; proposed, $1.13 per net ton.

4888. To amend Item 65 of C. F. A. T. B. Tariff 221A, I. C. C. 1460, to provide for non-application of class rates on **crushed stone**, carloads, from Linwood, Buffalo, Bettendorf, Ia., and Moline, Ill., to all points of destination in C. F. A. territory, as named in the tariff, allowing to apply in lieu thereof lowest combination.

4904. **Sand and gravel** (See Note 2), from Spaulding and Munger, Ill., to Ritchey, Ill. Present rate, $1.26; proposed, 88c.

CENTRAL FREIGHT ASSOCIATION DOCKET

20556. To establish on **sand and gravel**, carloads, Dayton, O., to Union City, Ind., via D. & U. R. R., rate of 85c per net ton of 2000 lb. Present rate, 90c per ton of 2000 lb.

20568. Amend Item 1245 of C. F. A. T. B. Tariff 130S, which provides rating on **crushed or ground limestone**, carloads, from East St. Louis, Joliet, Kellogg, Ill., St. Louis, Mo., and Springfield, Ill., originating at points west of the west bank of the Mississippi river, to C. F. A. and arbitrary territories, to provide that this rating will also apply from upper Mississippi river crossings on traffic originating beyond. Present rates, Official Classification basis.

20572. To establish on **limestone, crushed or ground**, from Valmeyer, Ill., to points shown below, following rates. Present and proposed rates in cents per ton of 2000 lb.

To	Pres.	Prop.
Akron, Ohio	610	412
Columbus, Ohio	540	373
Cincinnati, Ohio	500	342
Cleveland, Ohio	610	412
Toledo, Ohio	570	372
Youngstown, Ohio	640	432
Detroit, Mich.	590	392
Grand Rapids, Mich.	580	392
Evansville, Ind.	370	272
Ft. Wayne, Ind.	520	352
Indianapolis, Ind.	440	312
South Bend, Ind.	520	342
Louisville, Ky.	470	322
Pittsburgh, Penn.	700	482

20595. To establish on **crushed stone**, carloads, Silica, O., to various points in the state of Michigan on the following railroads: Pennsylvania, Grand Trunk Pere Marquette, Ann Arbor, Michigan Central and New York Central, rates as illustrated in Exhibit A attached. Present rates as illustrated in Exhibit A attached.

EXHIBIT A

Illustrations—Per net ton from Silica, O.,

To	Pres.	Prop.	To	Pres.	Prop.
Homer	138	107	Reeds		145
Lansing	138	125	Moorland		155
Otsego	184	145	Brent Creek		125
Centerline		102	Orville		130
Rochester		107	Melbourn		135
Hunters Crk.		117	Randall		
Millington		125	Beach		107
Bangor		145	Imlay City		117
Inkster		102	Kingston		135
Dexter		112	Owendale		145
Leslie		107	Perrin		125
Chandler		117	Kalamazoo		135
Oakley		135	Shelbyville		145
Swan Creek		135	Carlisle		145
Salzburg		145	Childsdale		155
Morgan		130	Pierson		165
Marengo		112	Borland		165
Kalamazoo		125	Reed City		175
Kendall		135	Hobart		185
Mattawan		135	Northville		97
Spring Arbor		107	Clyde		107
Union City		117	Flint		115
Temperance		70	Fostoria		125
Milan		82	Bridgeport		125
Whitmore Lake		97	Merrill		135
Byron		107	Riverdale		145
Elsie		125	Lakeview		155
Alma		135	Green Oak	125	102
Fraser		102	Williamston	125	115
Columbus		115	Gr'd Ledge		125
Washington		115	Clarksville		135
Rushton		117	Grandville		145
Munith		115	Waverly		155
Capac		125	Pearle		165
Besay		120	Bangor		165
Bancroft		120	Riverside		165
Trowbridge		125	Collins		135
Penfield		125	Shiloh		145
Pavilion		130	Greenville		145
Penn		140	Sidney		145
Drayton Plains		107	Blanchard		155
Linden		117	Moseley		145
St. Johns		130	Sparta		155
Lowell		135	Newaygo		165
Munica		145	Brunswick		175
Pompeii		130	Fruitport		165
Vickeryville		135	Hamilton		165
Lincoln Lake		145	Smith Crossing		135
			Reese		135
Atkins		165	Sebawaing		145
Applegate		165	Grassmere		155
McGregor		165	Melvin		155
Ruth		165	Mayville		145

20596. To establish on **sand and gravel**, carloads, Cleveland, O., to Zanesville, O., rate of 110c per ton of 2000 lb. Present rate, 130c per ton of 2000 lb.

20597. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, from Attica, Ind., to Naples, Valley City, Griggsville, Marysville and Pittsfield, Ill., rate of 113c per net ton. Present rate, 122c per net ton.

20613. To establish on **sand and gravel**, carloads, Hamilton, O., to Cincinnati, O., rate of 40c per net ton. Present rate, 50c per net ton.

20614. To add Marblehead, Ill., as an origin point in Item 748, Supplement 35, W. T. L. Tariff 58-M, on same basis of rates as now applicable from Quincy, Ill., on **limestone, crushed or ground**, carloads, as described in said item to C. F. A. destinations named therein.

20623. To establish on **sand and gravel**, carloads, Urbana, O., to Willoughby, O., rate of 145c per net ton. Proposed rate to apply via C. C. C. & St. L. Ry., Green Springs Junction, O., and N. Y. C. & St. L. Ry. or C. C. C. & St. L. Ry., Sandusky, O., and N. Y. C. R. R. (west). Present rate, sixth class.

20624. To establish on **ground or pulverized limestone**, carloads, Buffalo, N. Y., to Peoria, Ill., and related points, rate of 18½c. Present rate, 16c.

20628. To establish on **crushed stone**, in bulk, in open cars, and **stone screenings**, in bulk, in open cars, carloads, Kenneth, Ind., Deerfield and Union City, Ind., via Penn. R. R., rates of 95c and 100c per net ton, respectively. Present rate, 127c per net ton.

20629. To establish on **core sand**, carloads, from Juniata and Wampson, Mich., to Indianapolis, Ind., rate of 276c per net ton. Present rate, 302c per net ton.

20721. To establish on **sand, blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica**, carloads, Blissfield, O., to Huntington, Penn., rate of 320c per ton of 2000 lb. Present rate, 420c per ton of 2000 lb.

20722. To establish on **crushed stone**, in bulk, in open cars, carloads, Woodville, O., to Payne, O., rate of 105c per net ton. Present rate, 330c per net ton.

20723. To establish on **crushed stone and crushed stone screenings**, carloads, Delphos, O., to Hicksville, O., via N. Y. C. & St. L. R. R., Holgate, O., and B. & O. R. R., rate of 95c per ton of 2000 lb. Present rate, sixth class.

20724. To establish on crushed stone, carloads, from Spore, Penn., to destinations shown below. Present and proposed rates (in cents per net ton):

To	Prop.	Pres.
Cairo, W. Va.	180	6th class
Clarksburg, W. Va.	200	6th class
Grafton, W. Va.	210	6th class
West Union, W. Va.	190	6th class

20725. To establish on **pulverized limestone**, in bags in bulk in box cars, carloads, minimum weight 80,000 lb., except when car of less capacity is furnished, in which case marked capacity of car will govern, but in no case less than 60,000 lb., Sibley, Mich., to Detroit, Mich., rate of 84c per net ton. Present rate, 95c per net ton.

20595, Supplement 1. Commodity description in White Docket Advice 20595, and Docket Bulletin 1539, of January 25, 1929, now shown as "crushed stone," should be changed to read "**crushed stone and screenings and agricultural limestone**, in open top cars." This proposition deals with rates from Silica, O., to various points in Michigan.

20733. To establish on **crushed stone**, carloads, North Baltimore, O., to Gallup and Prentiss, O., rate of 70c per net ton. Route via B. & O. R. R., Hamler, O., and D. T. & I. R. R. Present rate, 190c per net ton.

20734. To establish on **crushed stone**, carloads, Lewisburg, O., to destinations shown below, following rates (in cents per net ton):

To	Pres.	Prop.
New Castle, Ind.	88	80
Messick, Ind.	88	80
Mooreland, Ind.	88	80
Losantville, Ind.	88	80
Modoc, Ind.	88	80
Carlos City, Ind.	88	75
Lynn, Ind.	88	70
Crete, Ind.	87	70

20738. To add E. J. & E. Ry. to list of carriers named in Item 1220 of C. F. A. Exceptions to Classification No. 130-S, providing for rating on **agricultural limestone, limestone screenings**, etc., and from Milwaukee, Waukesha and Burlington, Wis., to C. F. A. and Canadian Freight Association territories. Also to provide for the application of rates in connection with the E. J. & E. Ry., via East Joliet, Ill., to the same extent as now applicable with the C. M. St. P. & P., C. & N. W. and Soo Line railways.

20742. To establish on **stone, crushed**, in bulk only: **Crushed stone screenings**, in bulk only, carloads: **Limestone, agricultural** (not ground or pulverized), in bulk in open top cars only, carloads: **Stone tailings**, carloads, from Narlo, O., to destinations shown below, following rates, in cents per net ton: From Narlo, O., to Plymouth and Walkerton, Ind., present 173c, proposed 150c; La Porte, Ind., proposed 155c, N. K. P. stations. Milford Jct., Goshen and Elkhart, Ind., present 6th, proposed 145c, C. C. C. & St. L. stations. Wanatah, Ind., present class, proposed 165c, C. I. & L. stations. Hanna and Wellsboro, Ind., present class, proposed 155c, P. M. stations.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

16056. **Sand, core** (See Note 2), **Onset, Mass.**, to North Adams, Mass, 14. Reason—To establish rate comparable with other rates.

16143. **Stone, broken or crushed**, in bulk in gondola or other open top cars, carloads (See Note 2), from West Quincy, Mass., to Worcester, Mass., $1.10 per net ton, via N. Y. N. H. & H. R. R. Reason—To equalize competitive conditions.

16151. **Stone, broken or crushed**, in bulk, in gondola or other open top cars, carloads (See Note 3), from East Wallingford, Conn. (Reed's Gap Quarry), Conn., to Saundersville, Mass., $1.10 per net ton., via N. Y. N. H. & H. R. R. Reason—To provide rate comparable with that in effect to Worcester, Mass.

16182. **Sand, blasting, core, fire and sea** (See Note 2), from Pawtucket, R. I., to local stations on the N. Y. N. H. & H. R. R., same as in effect from Providence, R. I., etc., in Items 643-A, 645-D and 650-F of N. Y. N. H. & H. R. R., I. C. C. F-2875. Reason—To equalize competitive conditions.

16189. **Molding sand** (See Note 3), from Elnora, Reynolds, Schagticoke, Schuylerville, Scotia, Saratoga Springs, Stillwater, Wayville and Ushers, N. Y., to Saint John and Sackville, N. B., Amherst and Halifax, N. S., $5.54 per net ton. Reason—To meet carrier competition.

TRUNK LINE ASSOCIATION DOCKET

20171. **Broken stone**, carloads (See Note 3), from West Manayunk, Penn., to Pittsburgh, Penn., $3 per net ton. Reason—The proposed rate is fairly comparable with rate now in force from Foxcroft, Penn., to Pittsburgh, Penn.

M1078. **Stone, crushed or broken**, and **stone screenings** (See Note 2), to Glenville, Penn., from York, Penn., 70c, and from Bittinger and Thomasville, Penn., 60c per net ton, rates to expire July 1, 1929. Reason—To meet motor truck competition.

20185. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville and Tullytown, Penn., to Corbit, Del., $1.25 per net ton. Reason—The proposed rate is fairly comparable with rates on like commodities for like distances, services and conditions.

20197. **Stone, natural** (other than bituminous asphalt rock), **crushed**, carloads (See Note 2), from Marlboro, N. Y., to Florida, N. Y., $1.30 per net ton. Reason—The proposed rate compares favorably with rates to Goshen, Kipps and New Hampton, N. Y.

20201. To establish on **sand** (other than blast, engine, foundry, glass, molding or silica), carloads (See Note 2), from Cascade, Greer and Sturgisson, W. Va., to points on the B. & O. R. R. and Monongahela R. R., rates ranging from 70c to $1.40 per net ton. Reason—The proposed rates are fairly comparable with rates now in force from Pittsburgh and McKeesburg, Penn., to points in the same general territory.

20018, Supplement 1. **Limestone, ground, precipitated or pulverized**, and **limestone dust**, carloads, minimum weight 50,000 lb., from Ogdensburg, N. J., to Harrisonburg, Va., 22½c per 100 lb.

20221. **Limestone, crude, fluxing, foundry and furnace**, carloads, when shipped in open top equipment (See Note 2), from Stephens City, Va., to Follansbee and Weirton, W. Va., Midland and Aliquippa, Penn., $1.66 per gross ton, and to Sharon, Penn., Youngstown, Warren and Lowellville, O., $1.90 per gross ton. Reason—The proposed rates are fairly comparable with rates now in effect from Martinsburg, W. Va.

20239. **Stone chips or granules** (roofing granules), carloads (See Note 2), from Advance and Gladhill, Penn., to Highland, Mile End and Montreal, Que., 30c per 100 lb. Reason—The proposed rate is fairly comparable with rates now in force from Cardiff, Md., Delta, Slate Hill, Penn., etc.

20240. **Stone, crushed**, carloads (See Note 2), from Bound Brook, N. J., to Rariton River stations, 92c per net ton. Reason—Proposed rates are comparable with rates now in force from Morrisville, Penn.

Accident Frequency in the Portland Cement Industry

By F. E. Town
Chairman, Cement Section, National Safety Council

and W. Dean Keefer
Chief Engineer and Director of the Industrial Section, National Safety Council

SPECIALISTS in the field of accident prevention are paying more attention to accident *frequency* and correspondingly less to accident *severity*.

This attitude is due to the conviction that, from an accident prevention standpoint, a minor accident or even a near-accident is just as important as a fatality.

In the accompanying graphs an attempt is made to indicate the trend of accident frequency among the cement mill organizations, omitting consideration of the relative severity of the various accidents except to contrast those involving lost time with the fatalities. The figures used represent the operating plants within the membership of the Portland Cement Association in the United States and Canada, except a few which have not reported their accidents to the association. Thus these figures reflect a composite of the experience of at least 90% of all the cement mills of America.

Fig. 1 shows that the number of lost-time (including permanent disability and fatal) accidents per 100,000 man-hours worked has declined steadily during the last five years. This improvement has taken place notwithstanding the steady increase in the number of mills in operation and reporting, as indicated by the following table:

TABLE I—PROGRESS REDUCTION OF CEMENT MILL ACCIDENTS

Year	Operating plants reporting	Man-hours worked	Accident per mill	Accidents per 100,000 man-hours worked
1924	105	87,767,000	29.7	3.5
1925	118	97,415,000	22.1	2.7
1926	124	97,381,000	17.9	2.2
1927	136	93,471,000	10.0	1.4
1928	144	94,000,000*	7.3	1.2*

*Estimated.

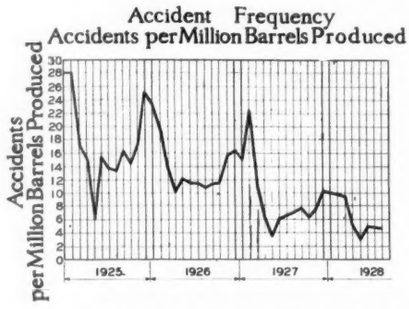


Fig. 2. Accident frequency in terms of accidents per barrel of cement produced, for the entire group of mills reporting to the Cement Association

While accident totals have declined to one-third the volume suffered during the first year of this period, the number of mills figuring in these reports increased by about 38%, although larger and more modern machinery, better operating practice, and possibly some other factors have tended to keep the total man-hours within a narrow range of variation. The number of accidents per million barrels of cement produced has also shown an interesting decrease, as indicated by Fig. 2.

Without endeavoring to draw overly fine distinctions or analyze in minute detail, we may fairly deduce from information apparent on the face of these curves that the men in the mills are thinking straighter, performing fewer unnecessary dangerous operations, and looking out for the other fellow to a far greater extent than was the case a few years ago.

Accidents are commonly the result of defective reasoning or lack of any reasoning at all; conversely, a record of steady reduction in accidents indicates improvement in concentration and straighter thinking. Better and safer machinery, tools and other equipment is a big factor, and due credit must be allowed those who undoubtedly have "built out" many of our accidents in the design or installation stage. However, it is highly significant that the older plants are showing substantially as great improvement as the newer ones, and the departments least affected by new type of equipment and mechanical safeguards are keeping abreast of others in which the probability of accidents has been much decreased by engineering revision and modern mechanical ingenuity.

The mills of the Lehigh Valley region, which as a group are among the oldest in America, provide an interesting case in point. Fig. No. 3, platting mills all of which have been operated many years, shows noteworthy improvement. This is even more strikingly shown by Fig. 4, which plats the annual record of each of the 16 mills in this group which have been operated during all of the last five years. Note the high rates and big spread during the first year, as compared with the low rates and reduced

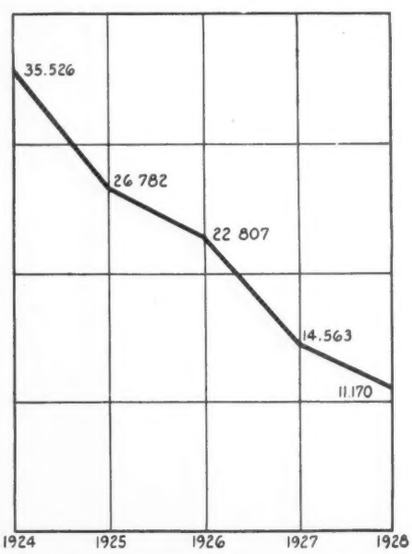


Fig. 1. Lost time accidents per 100,000 man-hours for the group of mills reporting their accidents to the Portland Cement Association. This group has grown from 105 in 1924 to 144 in 1928

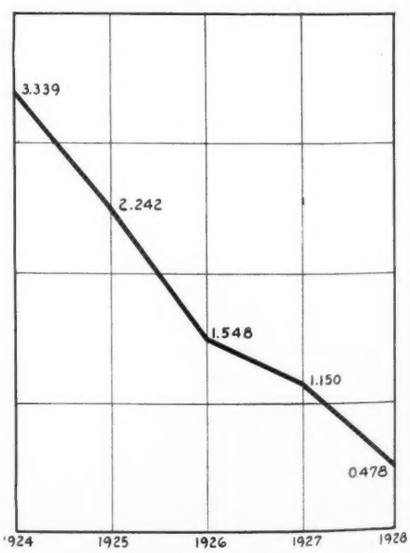


Fig. 3. Accidents per 100,000 man-hours worked, in the 16 reporting cement mills of the Lehigh Valley group which have operated during all of the last five years

spread shown by the 1928 figures.

Similarly, another typical group of mills, most of which have been in operation over a long period, is shown in Fig. 5. The Michigan mills average smaller in capacity than those in the Lehigh Valley, with a different labor situation and some other factors at variance with those faced by the eastern

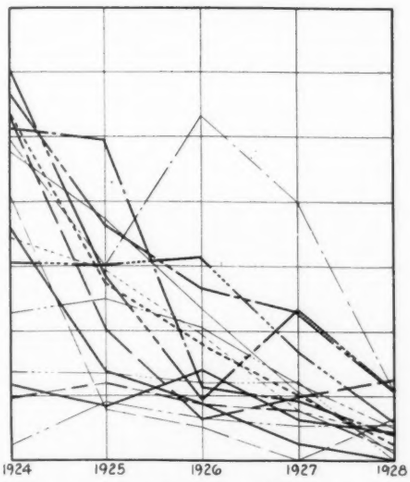


Fig. 4. Individual records of the sixteen mills in the Lehigh valley, a composite of whose accident experience is shown in Diagram 3

group. The results in accident prevention, as indicated by this diagram representing the six Michigan mills which have operated through the last five years, are very good.

A composite of the accident frequency of

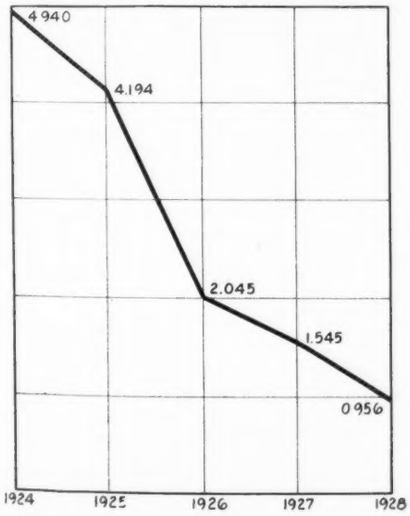


Fig. 5. Progress in accident prevention as shown by the experience of the six mills of Michigan which have operated and reported their accidents during all of the last five years

the four Illinois mills furnish another interesting example. Results in this case have not been so satisfactory. It may be stated in defense of the Illinois companies that all four mills of this group have been extensively rebuilt and added to, a heavy program of construction and development of quarries and mines entering in during every year of the five-year interval covered by Fig. 6.

The Pacific Coast group of eight mills which have operated during all of the last five years show decided improvement. Several of these mills have gone through difficult rebuilding periods or we might expect

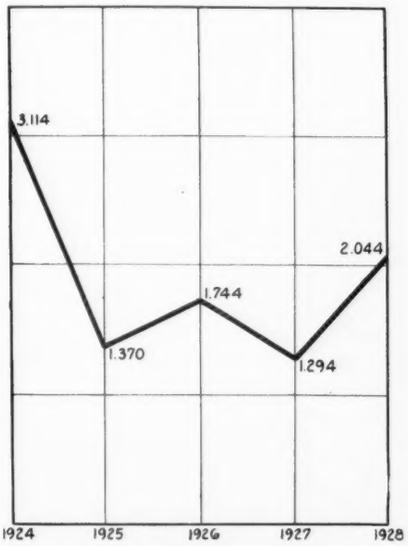


Fig. 6. The accident experience of the Illinois group runs counter to the general experience, but the unsatisfactory trend has been attributed largely to a continuous building program and major operating changes

a still better showing in Fig. 7. A reduction of almost 50% from 1927 to 1928 is too outstanding, however, to pass without special notice.

While the data presented in Table I indi-

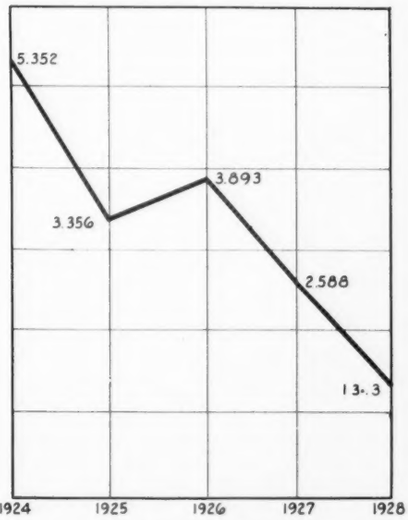


Fig. 7. The Pacific coast mills show a remarkable record of progress in spite of expansion involving many construction hazards

cate an interesting decline in accident rates per 100,000 man-hours worked and per mill. Fig. 8 shows the number of perfect safety records—plants operating for a year without a single lost-time accident. The first perfect record for an entire year was made in 1924. That year one mill out of the 105 then operating made this record. In 1925,

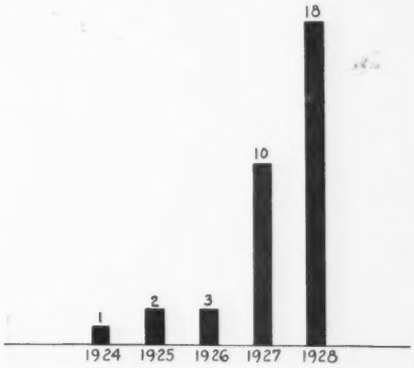


Fig. 8. Plants with perfect one-year safety records are on the rapid increase. In 1928 one-eighth of all operating plants had no lost time accidents

two mills, or one for every 59 then operating, completed the year without accident. In 1926 the ratio was one for every 62 mills; in 1927, one for every 13.6 mills, and in 1928, one for every 8 mills. Think of it! One mill in every eight has run an entire year without a single lost-time accident! An additional one-eighth of the entire number did almost as well by finishing the year 1928 with but one accident each.

It is almost equally interesting to inquire at the other end of the line—that is, investigate what progress is being made by the mills at the lower extremity of the list. In 1924 the mill with the poorest record reported 139 accidents; in 1925, the mill in the similar position at the foot reported 136 accidents; in 1926, 116 accidents; in 1927, 86 accidents, and in 1928, 74 accidents. These figures are illustrated in Fig. 9. Many individual mills which were once far down the list have made reductions at similarly en-

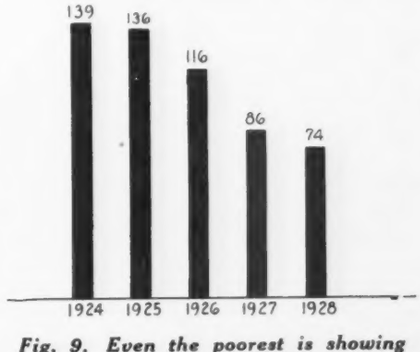


Fig. 9. Even the poorest is showing progress. In 1924 the plant at the bottom of the Portland Cement Association's record had 139 lost time accidents. In 1928 the poorest record totaled 74 accidents

W. Dean Keefer, chief engineer and director of the Industrial Section, National Safety Council, Chicago

couraging rates.

The question naturally arises as to the relative progress in accident frequency made by the various departments. What about the quarries and other supposedly "hazardous" portions of the mill group? How does the "yard" where there are no improved mechanical safeguards compare with the mill departments? Fig. 10 answers. The curves shown on these charts indicate the actual

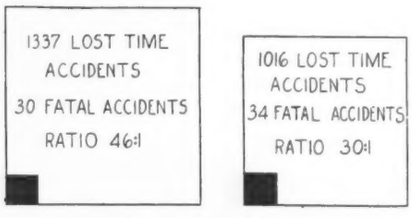


Fig. 11. As lost time accidents were reduced from 1337 in 1927 to 1016 in 1928 in the cement mills of this country and Canada, fatal accidents increased slightly. Proportionately, this increase seems large and a special sub-committee has been appointed by the association to study fatal accident conditions

number of lost-time accidents. Accidents per 100,000 man-hours would have been more enlightening, but unfortunately such figures are not available. However, the striking similarity of the trend of the accident totals for the various departments (the man-hours

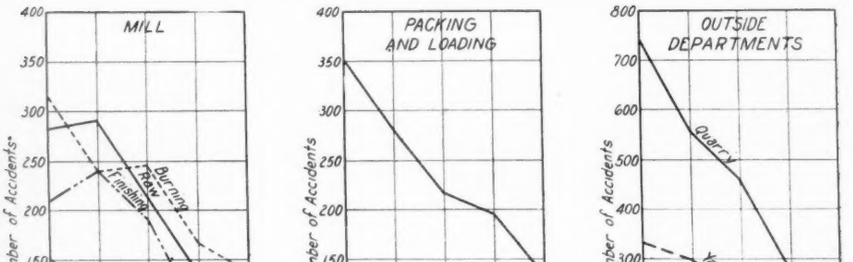


Fig. 10. Accident trend in the cement mills, by departments. Figures used are the totals for all plants reporting their accidents to the Cement Association

for which are known not to have varied greatly) would seem to indicate that present methods employed for the reduction of accidents in the cement industry, consisting mainly of educational and competitive projects, have been applied with about equal success in the reduction of mishaps in the different departments, without much regard for the relative "hazards" of each. It seems to be largely a case of getting results whenever or wherever the management together with the rank and file of operating men really become interested and want results sufficiently to work for them. No other factors are as important.

F. E. Town, superintendent, Manitowoc Portland Cement Co., Manitowoc, Wis., and chairman, Cement Section, National Safety Council

A number of experienced safety engineers who have gone over the facts represented by Fig. 11 feel that the more unfavorable ratio in 1928, if it has any significance, points to the need of more technical study of our accidents. It is possible that some of the more serious accidents are due to causes not reachable in all cases by the means the cement industry has been using. Possibly engineering revision, affecting equipment or operating methods, may furnish the answer in some cases.

However that may be, the greatest encouragement is occasioned by current reports indicating that as accident frequency in the cement industry declines, the operating force continues to aim higher and is not content with present results, much less to go backward. That attitude on the part of the superintendents, foremen and employees generally is the greatest asset and one of the most positive assurances that the accident rate will continue to drop.

More Mills Join Training Program

THAT the cement mills are in earnest in their decision to place the industry on a 100% basis so far as first aid and safety training are concerned has been made more apparent than ever by the many additional plants which have enlisted in the training program since announcement was made in ROCK PRODUCTS, February 2. According to the United States Bureau of Mines, most of the mills where the training has already started are adding to their classes and some are requesting permission to enroll the entire mill and quarry force.

The following plants have been scheduled for training in addition to those reported in ROCK PRODUCTS, February 2:

Alpha Portland Cement Co.—Martins Creek, Penn., No. 3; Martins Creek, Penn., No. 4; Manheim, W. Va.; Cementon, N. Y.; Bellevue, Mich.; LaSalle, Ill.; St. Louis, Mo.

Lone Star Cement Co.—New York, Hudson, N. Y.; Pennsylvania, Nazareth, Penn.; Texas, Dallas, Texas; Houston, Texas.

Marquette Cement Manufacturing Co., LaSalle, Ill.

Utah-Idaho Cement Co., Brigham City, Utah.

Since January 1, first aid training courses conducted by the United States Bureau of Mines have been completed in these plants:

Colorado Portland Cement Co., Boettcher (Colo.) plant—86 men trained.

Lehigh Portland Cement Co., Union Bridge, Md.—193 men trained.

Lone Star Cement Co., Alabama, Birmingham, Ala.—26 men trained.

Louisville Cement Co., Akron, N. Y.—7 men trained.

Yosemite Portland Cement Co., Merced, Calif.—43 men trained.

Yosemite Portland Cement Co., Clearing House, Calif.—27 men trained.

Quarry, Shale Pit and Crusher Accidents*

By C. W. Kels
Quarry Superintendent, Pennsylvania-Dixie Cement Corp., Gate City, Va.

IT IS A PLEASURE to be here in this fine meeting of men who are engaged in the cement industry and whose duties begin with quarrying and crushing of rock and shale. We have a common interest. I have been asked to make a few remarks leading to the discussion of accidents in quarries, shale pits and crushers, and I hope my remarks will bring out the really important points with respect to accidents in these departments, which are generally considered to have so many potential hazards.

The present day destruction of human life from accidental causes makes the subject of accident prevention a very important one and one which should not escape attention. Any commercial organization, wheresoever located and regardless of the business in which it is engaged, has the subject of accidents to consider. It cannot be sidestepped. Many of our industrial concerns have the subject to regard more seriously than others, depending upon the nature of the manufacturing process. The mining of ore, the manufacture of explosives and the manufacture of cement are examples of the more hazardous undertakings and require an unusual degree of thoughtfulness on the part of the employes, as well as operating officials, if accidents are to be reduced to the actual minimum.

It has been estimated that upwards of 100,000 men are engaged in quarrying pursuits, and that between 120 and 150 of these men are killed each year through various accidental causes. Approximately 15,000 others are injured yearly. This is an alarming condition and one to which too much attention cannot be given.

The nature and extent to which an employe may be incapacitated ranges from a minor scratch or cut to death. Accidents may be divided into two classes—avoidable and unavoidable, or they may be divided into those having fatal and non-fatal termination. Avoidable accidents may be prevented with a little forethought, but unavoidable accidents occur by reason of some unforeseen, unthought of or unlooked for circumstance. In the final analysis, the avoidable accidents are found to be very frequent and the really unavoidable accidents very rare.

My first experience of the avoidable and fatal class, which I will recall, happened at Speer's Ferry, Va., where the Clinchfield Portland Cement Corp., now a unit of the Pennsylvania-Dixie Cement Corp., had its quarry. A jap driller by the name of Greene had scaled the face of the quarry above the pit and advised his foreman that no further danger existed from stones rolling into the pit and that drilling for the afternoon could be carried on in safety. Scarcely had he and another driller started drilling when a boulder became dislodged from the face above and rolled down over the muck pile. Mr. Greene was warned to get out of the way, but he only smiled and the rock crushed him to death. This is an accident which could have been avoided had Mr. Greene heeded the warning of his fellow worker; and one where safety depended upon the employe himself. It goes without saying that a great deal of the credit in the reduction and elimination of injuries is due to employes themselves—give credit where credit is due. Without the cooperation of all the constituent members of any organization, the reduction of accidents is impossible.

An Unavoidable Accident

I recall an accident of the unavoidable class, in which the victim narrowly escaped death—this also happened at Speer's Ferry. The night foreman had prepared to do some secondary blasting. Four blasts from the plant whistle, which was our warning signal, had been sounded and the flagmen were at their posts. All necessary precaution had been taken. The 40 fuses comprising the shot were lighted and the men were on their way to safety. All was going well. At this time the light fuses in the power house were blown out and instantly pitch black darkness enveloped the entire quarry. This caused the foreman to become confused and he evidently lost his sense of direction and instead of proceeding on to his usual place of safety he ran back toward the shot. When the blast occurred a flying stone crushed his skull. Fortunately the foreman was not killed, but he was disabled for many months. This accident was unavoidable because the blowing of the fuses in the power house was unlooked for, unthought of and a most unusual occurrence; and it may be credited with being the direct cause of the severe personal injury inflicted.

It has been my experience in operating a quarry to observe that when secondary blasting is being done most of the men are together for the purpose of lighting fuses. After this has been accomplished, it is necessary that they run to a place of safety, and I have noticed that a rough quarry floor covered with old ties, large boulders and other obstructions impedes the men very greatly in their retreat to a safe shelter. This is particularly true where blasting is done at night. I remember once the safety valve and whistle blew off of a steam shovel and came down by the side of the machine. A pitman was warned and in attempting to get to safety he fell over a rock on the quarry floor and as a result he could not get away and the parts from the shovel hit the man in the head inflicting a severe cut. Had the quarry floor been free from obstructions the man would not have been hurt. A clean quarry floor is the best safeguard against possible injury from secondary blasting and a number of other causes. I am not trying to impress this safety meeting with the idea that my quarry floors have been kept clean in the past, but I have tried to keep them free from unnecessary obstructions, and it is quite possible for every quarry operator to do that much.

Accidents around a quarry are attributable to a great many causes and may happen in various ways, such as the following: One man received a broken leg from a stone shot through a 4-in. wall of oak lumber; another received severe burns about the legs and body from sitting too near a red hot stove; still another had a foot mashed between two gears on a steam shovel. Many other employes get fingers and toes mashed and cuts and lacerations, mostly from some act of carelessness. In fact, practically all of the accidents just mentioned can be traced directly to some careless act on the part of the injured or someone else.

Our crushing operation presents no very serious hazards. The dumping apron is not large and the stone does not drop far. When a car is dumped the men step aside to avoid being struck by any stone that might roll over the crusher mouth. We have never had an accident in this department.

Shale for the Kingsport plant is quarried at the mill. The operation is small, requiring only a few men. The face is about 22 ft. high—the break is always perpendicular and clean and secondary shooting is seldom required. Large shots are not made often. While the possibilities of accidents are reduced here, our efforts to avoid them are none the less reduced.

The inroads made upon the general health and strength of quarry workmen by accidents should be a constant reminder that carefulness is the first lesson for the would-be successful quarryman to learn. I have tried to conduct a relentless campaign against accidents in my quarry and as a result my employes have reached that state of perfection in accident prevention where it has been possible for them to work 486 days, exclusive of 81 Sundays, without a lost-time accident.

Prudence—wisdom applied to practice—is the greatest of all safeguards. As someone so aptly said: "The best safeguard is in a man's head." This certainly applies with full force to the quarryman.

*Talk given at the Chattanooga safety meeting of the southeastern mills of the Portland Cement Association.

Successful Safety Meeting at Chattanooga

P. C. A. Starts the New Year's Drive for 100% Accident Elimination

THE FIRST REGIONAL SAFETY MEETING of the series of 14 planned by the Portland Cement Association for 1929 was held at Hotel Patten, Chattanooga, on Tuesday, January 22. Eleven of the 12 cement mills represented in the membership of the Portland Cement Association in the southeastern states were represented. As this was the first regional safety meeting to be held in Chattanooga, there was some advance speculation as to the attendance, but a check up at the close of the meeting indicated that both in attendance and number of mills represented it slightly exceeded the showing when the same group met at Birmingham last year—98 persons were present.

W. H. Klein, general manager of the southern division of the Pennsylvania-Dixie Cement Corp., acted as chairman of the committee of arrangements, being assisted by R. S. Conner, superintendent, Signal Mountain Portland Cement Co.; A. E. Legg, superintendent of plant No. 3 of the Pennsylvania-Dixie Cement Corp. at Richard City, Tenn., and H. O. Underhill, superintendent of the Birmingham plant of the Alpha Portland Cement Co.

Among the guests of the occasion were: Major H. A. Reninger, president of the National Safety Council; F. Woodall Johnson, director of the Chattanooga Safety Council; Rev. Dr. Tom McCallie, R. M. Thigpen, workmen's compensation clerk, Alabama Industrial Commission; T. E. Lawson, deputy state factory inspector, and B. B. Stroud, deputy fire marshal of Tennessee.

W. H. Klein, Penn.-Dixie

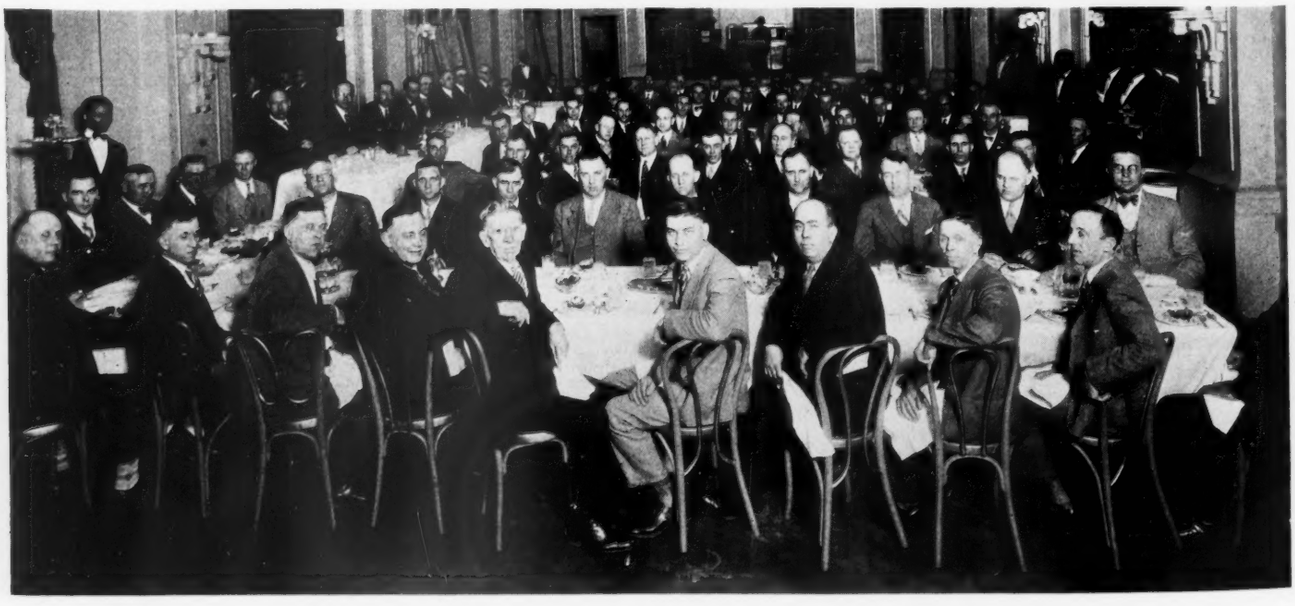
The program presented was as follows:

9:30 a. m. Morning session—W. H. Klein (Pennsylvania-Dixie), chairman.
Speakers:
"Safety From the Preacher's Viewpoint," Dr. Tom McCallie, pastor, Central Presbyterian church, Chattanooga.
"Experiences of a Cement Mill Surgeon," Dr. J. W. Kirkpatrick, Plant No. 3, Pennsylvania-Dixie.
"Industrial Accidents and Community Accidents," F. Woodall Johnson, director, Chattanooga Safety Council.
12:15 p. m. Luncheon—H. O. Underhill (Alpha), presiding.
2:00 p. m. Afternoon session—R. S. Conner (Signal Mountain), chairman.
Address by W. Jess Brown, southern sales manager, Pennsylvania-Dixie Cement Corp., Chattanooga.

Round table discussion led by the following:

1. Quarries, Clay Pits and Crushers—C. W. Kels, Penn.-Dixie, quarry superintendent, Gate Vity, Va.
2. Raw and Finish Mills—A. G. Morgan, Penn.-Dixie, general mill foreman, Richard City.
3. Power, Shops and Repairs—D. M. Stokes, Lone Star, assistant chemist, Lone Star, Birmingham.
4. Coal Grinding and Handling—Q. E. Phillips, Alpha, Birmingham.
5. Packing and Shipping—R. H. MacFetridge, Lehigh, Birmingham.
6. Railroads and Yards—W. Forster, Lone Star, New Orleans.

6:30 p. m. Safety dinner—A. E. Legg (Penn.-Dixie), toastmaster.



Regional safety meeting of the P.C.A., Chattanooga, Tenn., January 22, 1929

D. G. (Boss) Morgan (left) and Joseph Ullman (right), Penn.-Dixie

Address—Major H. A. Reninger, president, National Safety Council.
Song leader—Edson Hardy.

At the request of the chairman, A. J. R. Curtis, secretary of the committee on accident prevention of the Portland Cement Association, read the records made by cement industry during the year just closed and contrasted these forcefully with the excellent records of the southeastern mills. The reports showed that whereas the average number of accidents per plant for the United States and Canada was 7.25 in 1928, the average for the southeastern plants was only 6.2 for the same period, with only one mill out of 11 dropping below this average.

The progress made in the mills of the southeastern states was particularly good by comparison with past records, which heretofore had been below the average for the entire association group. This condition was assumed to be due largely to the employment of negro labor, but the 1928 accident figures are making it necessary for southeastern operators to revise their ideas along these lines.

The appearance in the meeting of Felix Guenther, Jr., general superintendent of the Kingsport mill of the Pennsylvania-Dixie Cement Corp., and his quarry superintendent, C. W. Kels, was the signal for a tumultous demonstration in honor of the Kingsport plant, which has just been announced as the first in the southeast to win the Portland Cement Association safety trophy. Honors were also accorded to the Birmingham plant of the Lehigh Portland Cement Co. and the Richard City plant of the Pennsylvania-Dixie Cement Corp. for completing 1928 with only one accident each.

On the day following the meeting an inspection party was organized to visit the Richard City mill of the Pennsylvania-Dixie Cement Corp. and look over sights of historic interest around Chattanooga.

An excellent paper by C. W. Kels, which opened the round table discussion of quarry accidents, appears on a preceding page.

Attendance

Alpha Portland Cement Co., Birmingham, Ala.
H. O. Underhill, superintendent.
F. G. Borden, chemist.
M. H. Floyd, electrician.
Q. E. Phillips, assistant superintendent.

Atlas Portland Cement Co. (The), Leeds, Ala.
L. M. Funderburg, assistant plant manager.
A. D. Blair, superintendent, power and shops.

Florida Portland Cement Co., Tampa, Fla.
S. J. Bero, purchasing agent.
O. T. Bogren, chief electrician.

Lehigh Portland Cement Co., Birmingham, Ala.
R. H. MacFetridge, superintendent.
O. C Brown, chief clerk.
A. Carlson, mill foreman.
H. A. Reninger, special representative, Allentown, Penn.

International Cement Corp.
A. D. Stancliffe, general superintendent, southern division, Birmingham.

Lone Star Cement Co., Alabama, Birmingham p'ant
E. N. Harrison, chief engineer, St. Stephens quarry.
J. M. Henderson, mill foreman.
F. E. Lehner, machine shop foreman.
G. N. Pierce, chief electrician.
W. C. Powell, cost clerk.
D. M. Stokes, assistant chemist.

Lone Star Cement Co., Alabama, Spocari plant
W. W. Deadman, superintendent.
A. L. Kilgore, chemist.

Lone Star Cement Co., Louisiana, New Orleans
W. Forster, assistant superintendent.
L. S. Holzhalb, Jr., assistant chemist.

Pennsylvania-Dixie Cement Corp., Chattanooga
W. H. Klein, general manager, southern division.
W. Jess Brown, general sales manager.

Pennsylvania-Dixie Cement Corp., Kingsport plant
F. Guenther, Jr., general superintendent.
C. W. Kels, superintendent, Gate City quarry.

Pennsylvania-Dixie Cement Corp., Clinchfield plant
Chas. S. Vance, superintendent.
G. P. Hunnicutt, mill foreman.
W. G. Riley, safety director.
D. M. Ryle, machine shop foreman.

Pennsylvania-Dixie Cement Corp., Dixie Sand and Gravel Co., Chattanooga
J. L. Bell.
Walter Flach.

Pennsylvania-Dixie Cement Corp., Richard City p'ant
A. E. Lagg, superintendent.
C. H. Allis, machine foreman.
Claud Alton, crane operator.
S. L. Brannan, shift foreman.
Homer Brewer, locomotive engineer.

Further Regional Meetings Announced

SEVERAL REGIONAL SAFETY MEETINGS in addition to those mentioned in the initial notice which appeared in Rock Products for January 5, have been arranged by the Portland Cement Association, according to J. B. John, chairman of the committee on accident prevention.

In the issue referred to above notice was given of meetings to be held at the Kansas City Athletic Club, Kansas City, Mo., on Tuesday, February 12; Hotel Baker, Dallas, Tex., on Thursday, February 14; Hotel Kaskaskia, La Salle, Ill., on Tuesday, February 26, and at Hotel Kentucky, Louisville, Ky., on Tuesday, March 5. Meetings added to the initial list are as follows:

MASON CITY, IOWA, on Wednesday, March 20. Morning, afternoon and evening sessions will be held at Hotel Hanford, attended by representatives of the following mills: Dewey Portland Cement Co. at Davenport, Hawkeye Portland Cement Co. at Des Moines, Lehigh Portland Cement Co. at Mason City, Northwestern States Portland Cement Co. at Mason City and Gilmore City, Pyramid Portland Cement Co. at Des Moines, and Universal Portland Cement Co. at Duluth, Minn. G. C. Blackmore, chief chemist of the Northwestern Portland Cement Co. at Mason City, is acting as chairman of the committee on arrangements.

WASHINGTON, D. C., on Tuesday, April 2. The mills of the Lehigh Portland Cement Co. at Fordwick, Va., and Union Bridge, Md., Lone Star Cement Co. at Norfolk, Va., and Sandusky Cement Co. at York, Penn., will participate. William Moeller, general superintendent of the International Cement Corp., eastern division, is chairman of the arrangements committee and will announce place of meeting and program details shortly.

ALBANY, N. Y., on Tuesday, April 15. Sessions will be held morning, afternoon and evening at Hotel Ten Eyck. C. S. Andres, superintendent of the Lone Star Cement Co. of New York, at its Hudson plant, is chairman of the committee on arrangements. The mills of eastern New York, New England and Quebec, including the following plants, will be represented: Alpha Portland Cement Co., Jamesville, N. Y.; Atlas Portland Cement Co., Hudson, N. Y.; Canada Cement Co., Ltd., Montreal, P. Q.; Glens Falls Portland Cement Co., Glens Falls, N. Y.; Lone Star Cement Co. of New York, Hudson, N. Y.; North American Cement Corp. at Catskill and Howe's Cave, N. Y., and Pennsylvania-Dixie Cement Corp. at Portland Point, N. Y.

ALLENTOWN, PENN., on Thursday, May 23. The meetings, which are in charge of a local committee of which David Adam, safety engineer of the Lawrence Portland Cement Co., at Northampton, Penn., is in charge, will be held in the Americus Hotel. All of the 25 member mills of the Portland Cement Association in the Lehigh Valley district will send delegations. An invitation will be extended to the 36 delegates of the mills which won the association trophy for 1928 to attend, and it is expected that they will do so as they will be assembled in New York City on the previous day to receive the formal trophy award.

DETROIT, MICH., on Tuesday, July 9. Morning, afternoon and evening sessions will be held in the Book-Cadillac hotel, in which all of the cement mills of Michigan will participate.

A. T. Brown, safety inspector.
J. W. Brown, coal miller.
Jessie Cox, burner.
Sam Crumbliss, carpenter.
M. G. Currier, gardener.
W. V. Deakins, cashier.
P. M. Dickerson, time keeper.
Edw. Dobbins, sack foreman.
Bailey Dodson, repairman.
C. W. Dodson, mill foreman.
E. W. Faris, burner.
Ova Fine, shovel engineer.
J. R. Gurdi, master mechanic.
C. E. Hardy, engineer.
A. A. Holm, engineering department.
W. E. Keener, quarry foreman.
J. W. Killian, repairman.
J. W. Kirkpatrick, M. D., surgeon.
L. F. Metcalf, burner.
S. N. Moore, packing foreman.
D. G. (Boss) Morgan, general foreman.
C. E. Nobles, machinist.
Tate O'Connor, draftsman.
C. E. Palmer, electrician.
H. W. Raulston, crusher department.
Elwood Shaw, employment manager.
H. Steward, repairman.
W. C. Thomas, foreman.
T. Thompson, construction.
Joseph Turner, repair foreman.
Joseph Ullman, safety director.
C. H. Washburn, millwright.

Signal Mountain Portland Cement Co., North Chattanooga

R. R. Caskey, assistant general manager.
R. S. Conner, superintendent.
J. H. Baker, blacksmith.
P. R. Beck, chemist.
Paul Campbell, miller.
Jack Coleman, head burner.
Carl Cross, mechanic.
Fred DeFue, storekeeper.
Frank Degnan, master mechanic.
W. M. Figgins, repairman.
P. G. Garrett, packing foreman.
H. A. Griffith, burner.
Fillmore McDonald, hack foreman.
J. P. Merrimen, mechanic.
J. F. Nipper, shift foreman.
G. T. Pearce, chief electrician.
R. F. Sullivan, assistant superintendent.

Others:

A. J. R. Curtis, assistant to general manager, Portland Cement Association, Chicago.
A. U. Miller, associate mining engineer, U. S. Bureau of Mines, Vincennes, Ind.
R. M. Thigpen, workmen's compensation clerk, state of Alabama, Montgomery, Ala.
T. E. Lawson, deputy state factory inspector, Nashville, Tenn.
B. B. Strand, deputy state fire marshal, Nashville, Tenn.
F. Woodall Johnson, manager, Chattanooga Safety Council.
J. J. Conners, safety engineer, Tennessee Electric Power Co., Chattanooga.
L. W. Hope, mining engineer, Chattanooga.
H. G. Jacobsen, Bates Valve Bag Corp., Chicago.
J. H. Guenther, president, Lookout Paint Co., Chattanooga.

Three Plants of the Charles Warner Co. Have Perfect Safety Records

THREE plants of the Charles Warner Co. of Wilmington, Del., and the American Lime and Stone Co. of Bellefonte, Penn., made perfect safety records during the past year, according to the January issue of the *Warner-American News*, house organ of the companies. The Union Furnace, Penn., plant of the latter company was first in the first division, and the Marlborough street and Forty-ninth street yards in Philadelphia led in the second division. The total time worked by these three units was 140,311 hours, without any lost time accidents. This is equivalent to 17,538 days of eight hours each or to one man working 58 years, without losing any time from accidents.

The thirteen plants and yards of the two companies will again engage in a similar contest for 1929, with the same scale of computation. This scoring method is that advocated by the National Safety Council.

Quarry Community Safety

ON TUESDAY EVENING, January 15, the quarry industries of Bellefonte, Penn., including the American Lime and Stone Co., Whiterock Quarries, Inc., and Chemical Lime Co., held a joint safety meeting in the auditorium of the Bellefonte high school. The meeting was called at the request of the State Department of Labor and Industry and conducted by Thomas J. Quigley, chief of the mines and quarry section of that department. About 300 persons were present, consisting of employees and their families from the three companies. A one-reel moving picture, entitled "How Johnnie Won the Game," opened the program, and in this picture Johnnie was the son of a quarry foreman who was interested in a school baseball team. Johnnie saved the day by very quick thinking and preventing the pitcher of his team from being injured in setting off a dynamite cap that the boys had found while playing ball.

The next picture shown was of two reels showing various operations of stone. trap rock and slate quarries in the state of Pennsylvania. Following the second picture, Mr. Quigley gave a very interesting talk, telling of the work of accident prevention that is being carried on by the Department of Labor and Industry, and he stated that the community of Bellefonte was one of the principal leaders in the safety movement among quarry industries. He said that the first community quarry safety meeting ever held in Pennsylvania was held in Bellefonte as a joint meeting with employees of these three companies two years ago. Since then many other communities have held similar meetings. The results of the safety work in these Bellefonte industries is very gratifying. One of the quarries has operated as long as a six months' period without a single lost-time accident. Others have had very decided improvements in their records, and there is every indication that the future will bring even better success.

Following Mr. Quigley's talk, Samuel M. Shallcross, generla manager of the American Lime and Stone Co., complimented Mr. Quigley on the results obtained due principally to his efforts, and pledged the continued support and interest of the company and employees. Ray Noll, general manager of the Whiterock Quarries, Inc., followed with a similar statement, as did Swengel Smith, superintendent of the Chemical Lime Co.

A two-reel picture then followed, entitled "The Verdict." "The Verdict" has been prepared under the direction of the National Safety Council and has been declared by authorities all over the country to be one of the very best safety pictures of general interest ever produced. This picture depicts a young man, son of a prominent judge, who is always out for a good time and fails to heed the warnings of his father and the traffic laws and, after escaping from many near-accidents, winds up by killing his father when he passes a street car taking on passengers. The picture is wonderfully well worked out, is full of life and common interest. The lesson is teaches is brought home vividly and should certainly have the desired effect.

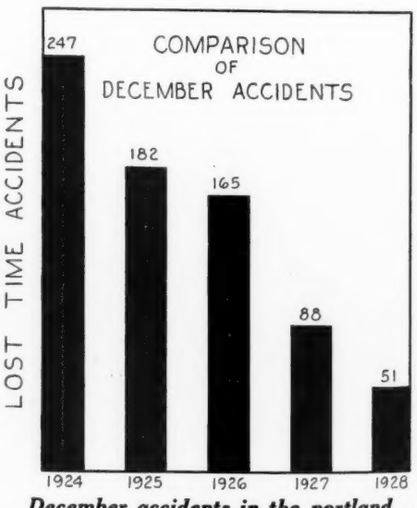
Mr. Quigley was assisted by Messrs. Gramely and Ross, also of the Department of Labor and Industry, who operated the moving picture machine, while arrangements for the meeting were made by A. C. Hewitt, who is in charge of safety work for the American Lime and Stone Co.

Plans were all made to have the Pennsylvania Railroad quartet of Harrisburg sing several numbers at this meeting, but unfortunately word was received just before the meeting telling of the sudden death of the leader of this quartet, who had contracted influenza, and therefore the quartet was unable to appear.

December Accidents Decline

THE PORTLAND CEMENT ASSOCIATION has just announced another record decline in December accidents in the 144 operating mills of its members. In fact December, 1928, not only smashed all precedent for December, in the low number of accidents reported, but it came very nearly tying the safest month in the history of the cement industry—June, 1928.

Last June, under stress of a great no-accident campaign with several weeks preparation, a new figure was set for the mills,



December accidents in the portland cement industry

with a record showing of 51 accidents, 50 lost-time and 1 fatal. In December, without a special campaign, but with the simple appeal before them to "make the new year happy for every operating man and his family," the month was completed with 51 accidents—49 lost-time and two fatal. The accompanying diagram shows this record graphically.

New California Marble Deposits Located

DISCOVERY of what appears to be a large and valuable deposit of marble has been made within the past month by Herbert Shaw, local prospector and expert on minerals.

The find was made a few miles southeast of the town of Tuolumne, Calif. The deposit on surface has a width of approximately 20 ft. and is traceable for a long distance. The marble possesses a diversity of colors and is capable of fine polish and is particularly suitable for finishing building interiors and for decorative purposes, it is claimed.

The deposit is within a short distance of a wagon road and but five miles from the railroad depot at Tuolumne, Mr. Shaw states.

A 25-lb. specimen of the stone, cut and polished by Ed Hill, local marble expert, is on exhibition in the county exhibit building and is attracting no little attention. Mr. Hill is quoted as having pronounced the stone a high quality variegated marble.—*Stockton* (Calif.) *Record.*

Johns-Manville Head Predicts Big Year in 1929

T. F. MERSELES, president of Johns-Manville Corp., states that indications are that 1929 will be an exceedingly good year. He said that general conditions are reported good in practically all sections, especially regarding agriculture, wages, employment, and living conditions. His statement in part follows:

"Conditions throughout the country relating to the many and varying industrial and business activities with which we are in intimate contact are so favorable as to indicate that 1929 will be an exceedingly good year, with extensive expansion programs to be noted in various localities, particularly in the South and West, and in those sections where several of the basic industries predominate.

"Increasing recognition on the part of industry for the need of greater production economies is a favorable sign for those whose service is based on improving present efficiencies. This trend is not limited to any one industrial activity but applies to industry in general, to railroad transportation, public utilities, and to government and municipal operations.

"General conditions are reported good in practically all sections, especially regarding agriculture, wages, employment, and living conditions. A dominating factor is the degree of confidence in the new federal administration that prevails everywhere.

"Increased activities in the way of expansion and improvements by certain railroads, public utilities, and municipalities, and by many of the more important industries are already planned and many others will undoubtedly shortly announce extensive improvements.

"In the general building field, there is every indication of a continuance of the present active program, augmented in certain sections by specific improvements, outstanding both in character and in the expenditures involved.

"Not only do various influencing factors point to a particularly good year to us in the United States, but a survey of our export business prospects, particularly in South America and the Far East, indicate that this phase of our business will produce even greater increases in volume and profit. Conditions in Canada are particularly favorable and the rapid industrial expansion and development of that country insures an ever increasing market. We have every anticipation that the coming 12 months will mark another notable milestone in the history of American prosperity."

Unload Trainload of Agstone During Winter

A SOLID trainload of agricultural limestone was unloaded by Lawrence county farmers in one day recently. Handling 600 tons of agricultural limestone is no small job, but the modern spirit of cooperation makes big things possible on the farm.

Under the leadership of A. W. Klemme, extension agent of Lawrence county, orders for limestone were pooled and sent to the Independent Gravel Co. of Carthage, and a special train was ordered through John T. Stinson of the Missouri Pacific Railroad Co.

The arrangements for transportation and unloading were made for December 5, rain or shine, each farmer to furnish two unloaders for the pool. These men traded work throughout the day. A heavy rain followed by freezing weather just after the cars were loaded resulted in a frozen crust of 3 to 5 in., which had to be broken with crowbars and picks before the unloading could be started.

Unloading was on the right of way at points selected by the farmers. Some were able to unload just across the fence from the fields where it is to be distributed, saving wagon hauls of three to five miles. A manufacturer of lime spreaders was on hand demonstrating the value of his method of economical distribution.

Practically every one of the farmers have used limestone on their farms before and are increasing the acreage of cow peas, soybeans, alfalfa or some of the legume crops.

The operation of the train was in charge of A. P. Boles, for the Missouri Pacific railroad, assisted by M. J. Farrell, roadmaster, and F. W. Anderson, traveling freight agent, A. W. Beitler of the New Idea Machinery Co. and E. L. Ratliff of the Independent Gravel Co.—*Kansas City* (Mo.) *Star.*

Florida Foreign Shipments of Phosphate

FIFTEEN foreign flags have been flown on the vessels which have docked at the railroad elevators for phosphate, with Cuban ships heading the list. Countries from which ships have been sent for cargoes of phosphate include Russia, Japan, China, France, England, Sweden, Germany, Honduras, Cuba, Mexico, Spain, Italy, Belgium, Panama and Scotland.

According to reports compiled by the Atlantic Coast Line and Seaboard railway elevator employes, 689,585 tons of phosphate rock was taken aboard foreign-bound ships during the first 11 months of 1928 at Tampa, Fla.

The largest month of the year for foreign phosphate tonnage was August, with the month of May a close second, the report indicates. There were 81,434 tons of phosphate shipped from port in August and 78,197 in the second largest month.—*Jacksonville* (Fla.) *Times-Union.*

Cost Studies of Slate Industry

FOR THE PAST EIGHT YEARS the United States Bureau of Mines, Department of Commerce, has devoted considerable attention to the slate industry, first in making a detailed study of the technology of mining and manufacture, the results of which were published as Bulletin 218, "The Technology of Slate." Subsequent studies dealt with special problems, the latest being the introduction of the wire saw in quarries.

The intimate knowledge thus gained of all phases of slate production has brought to light certain business or economic problems, the solution of which would lead to increased growth and prosperity in the industry. As a first step toward a consideration of these problems, the Bureau of Mines, with the support of several leading producers, has undertaken a detailed cost study of slate quarrying and manufacture.

A cost questionnaire, compiled with the assistance of the National Slate Association and several producers, has been submitted to 111 slate producers. It is expected that results of value will be obtained, not only in establishing better cost accounting systems, and in stabilizing the industry, but in pointing out avenues for further profitable investigation.

Chalk Classification on Crayons Allowed on Protest

MERCHANDISE assessed at 45c. per gross and 25% ad valorem, under paragraph 1451, act of 1922, as crayons, was held to be of a different composition from crayons and duitable at only 25% ad valorem, as chalk, under paragraph 20, in a decision by the United States Customs Court, sustaining a protest of A. W. Faber, Inc. (Protest No. 239492-G-42009-27.)

Building Prospects in 1929

THE ARCHITECTURAL FORUM and its companion publications of the National Building Group have completed a detailed survey of potential building activity. If the deductions which have been drawn from a great array of dependable facts and figures are correct, it is quite probable that the year 1929 may prove to be the greatest of building construction years.

The building industry is apparently to be called upon to provide the facilities for increased production demands and for increased business activity. In the institutional field it is obvious that increased construction of new hotels should not be expected because in general we have enough space of this character.

The hospital field in 1929 is evidently to have a breathing spell in actual construction activity, but it will be a tremendous year of planning to meet great hospitalization programs which are being undertaken by more communities than ever before. The school field shows a steady upward trend, which is but natural in view of the expansion of our educational facilities, a condition which always accompanies prosperity.

While every condition points to a continuation of building activity and perhaps the exceeding of all past records to the amount of 4 or 5% for the year 1929, there are, of course, some significant changes. To measure the change in public demand we can compare the percentage figures of our 1928 forecast with those of our 1929 forecast thus:

COMPARISON *of* PUBLIC DEMAND *for* NEW BUILDINGS

(1929 Forecast Compared with that of 1928)

Figures from Annual Building Forecast of NATIONAL BUILDING PUBLICATIONS

NORTH ATLANTIC STATES

Type of Building	*Requirements for New Buildings by Percentages*		
	1928	*1929*	*Change*
Automotive	3.9	2.1	—1.8
Banks	4.2	2.7	—1.5
Apartments	20.0	18.5	—1.5
Apartment Hotels	.2	1.0	+ .8
Clubs, Fraternal, etc.	2.6	3.5	+ .9
Community, Memorial	.8	1.1	+ .3
Churches	2.9	2.8	— .1
Dwellings (under $20,000)	4.4	4.2	— .2
Dwellings ($20,000 to $50,000)	4.0	2.0	+2.0
Dwellings (over $50,000)	2.6	2.2	— .4
Hotels	6.2	4.8	—1.4
Hospitals	6.0	5.6	— .4
Industrial	4.6	6.6	+2.0
Office Buildings	8.0	12.3	+4.3
Public Buildings	7.1	9.4	+2.3
Schools	11.4	8.4	—3.0
Stores	3.1	4.0	+ .9
Theaters	2.5	3.2	+ .7
Welfare, Y.M.C.A., etc.	2.4	2.4	—

SOUTHWESTERN STATES

Type of Building	*Requirements for New Buildings by Percentages*		
	1928	*1929*	*Change*
Automotive	4.8	2.9	—1.9
Banks	2.8	1.6	—1.2
Apartments	6.2	5.7	— .5
Apartment Hotels	3.6	4.3	+ .7
Clubs, Fraternal, etc.	4.1	3.6	— .5
Community, Memorial	1.5	1.6	+ .1
Churches	5.8	6.6	+ .8
Dwellings (under $20,000)	4.5	3.1	—1.4
Dwellings ($20,000 to $50,000)	3.4	2.1	—1.3
Dwellings (over $50,000)	3.1	1.6	—1.5
Hotels	12.5	12.5	—
Hospitals	5.9	3.5	—2.4
Industrial	3.4	9.8	+6.4
Office Buildings	15.9	11.4	—4.5
Public Buildings	4.9	5.1	+ .2
Schools	12.8	16.5	+3.7
Stores	2.2	2.2	—
Theaters	1.0	2.1	+1.1
Welfare, Y.M.C.A., etc.	1.6	3.8	+2.2

NORTHEASTERN STATES

Type of Building	*Requirements for New Buildings by Percentages*		
	1928	*1929*	*Change*
Automotive	5.4	5.4	—
Banks	3.4	5.9	+2.5
Apartments	3.3	6.3	+3.0
Apartment Hotels	.2	1.0	+ .8
Clubs, Fraternal, etc.	3.4	2.7	— .7
Community, Memorial	1.0	1.3	+ .3
Churches	6.4	7.9	+1.5
Dwellings (under $20,000)	6.4	4.1	—2.3
Dwellings ($20,000 to $50,000)	3.7	3.9	+ .2
Dwellings (over $50,000)	2.8	2.5	— .3
Hotels	6.9	8.1	+1.2
Hospitals	7.3	7.1	— .2
Industrial	5.8	7.6	+1.8
Office Buildings	8.5	4.7	—3.8
Public Buildings	7.8	5.8	—2.0
Schools	13.6	16.8	+3.2
Stores	3.8	2.4	—1.4
Theaters	7.	2.4	—4.6
Welfare, Y.M.C.A., etc.	3.3	4.1	+ .8

MIDDLE STATES

Type of Building	*Requirements for New Buildings by Percentages*		
	1928	*1929*	*Change*
Automotive	3.8	3.2	— .6
Banks	1.9	3.2	+1.2
Apartments	10.6	9.7	— .9
Apartment Hotels	6.0	5.5	— .9
Clubs, Fraternal, etc.	4.9	3.8	—1.1
Community, Memorial	2.4	1.0	—1.4
Churches	4.1	3.9	— .2
Dwellings (under $20,000)	2.8	2.3	— .5
Dwellings ($20,000 to $50,000)	2.1	2.1	—
Dwellings (over $50,000)	1.8	1.4	— .4
Hotels	6.0	5.7	— .3
Hospitals	6.3	4.1	—2.2
Industrial	6.9	8.7	+1.8
Office Buildings	15.0	17.0	+2.0
Public Buildings	7.5	4.9	—2.6
Schools	9.3	14.4	+5.1
Stores	2.3	3.1	+ .8
Theaters	4.1	4.2	+ .1
Welfare, Y.M.C.A., etc.	2.2	1.8	— .4

SOUTHEASTERN STATES

Type of Building	*Requirements for New Buildings by Percentages*		
	1928	*1929*	*Change*
Automotive	4.8	5.3	+ .5
Banks	1.3	.8	— .5
Apartments	8.2	7.5	— .7
Apartment Hotels	2.9	3.6	+ .7
Clubs, Fraternal, etc.	1.7	1.1	— .6
Community, Memorial	.3	1.1	+ .8
Churches	7.4	16.3	+8.9
Dwellings (under $20,000)	5.1	4.8	— .3
Dwellings ($20,000 to $50,000)	4.7	4.2	— .5
Dwellings (over $50,000)	4.0	4.0	—
Hotels	11.7	10.1	—1.6
Hospitals	5.1	3.3	—1.8
Industrial	4.2	11.2	+7.0
Office Buildings	5.8	3.5	—2.3
Public Buildings	2.9	4.4	+1.5
Schools	21.6	9.3	—12.3
Stores	3.0	3.2	+ .2
Theaters	2.5	2.7	+ .2
Welfare, Y.M.C.A., etc.	2.8	3.6	+ .8

WESTERN STATES

Type of Building	*Requirements for New Buildings by Percentages*		
	1928	*1929*	*Change*
Automotive	3.0	2.4	— .6
Banks	1.2	2.2	+1.0
Apartments	11.7	14.3	+2.6
Apartment Hotels	5.9	7.1	+1.2
Clubs, Fraternal, etc.	2.3	2.7	+ .4
Community, Memorial	1.7	1.9	+ .2
Churches	6.1	3.4	+2.7
Dwellings (under $20,000)	4.3	4.1	— .2
Dwellings ($20,000 to $50,000)	4.0	2.5	—1.5
Dwellings (over $50,000)	2.7	2.2	— .5
Hotels	6.9	11.2	+4.3
Hospitals	6.3	5.6	— .7
Industrial	3.7	4.9	+1.2
Office Buildings	14.2	14.8	+ .6
Public Buildings	4.7	4.7	—
Schools	13.3	9.8	—3.5
Stores	4.1	3.9	— .2
Theaters	2.8	1.5	—1.3
Welfare, Y.M.C.A., etc.	1.0	.8	— .2

BUILDING TYPES	N. EASTERN STATES	N. ATLANTIC STATES	S. EASTERN STATES	S. WESTERN STATES	MIDDLE STATES	WESTERN STATES	U. S. A.
Automotive	$14,469,400	$42,132,200	$7,447,000	$10,670,000	$56,322,200	$14,539,800	$145,580,600
Banks	15,730,000	53,312,600	1,148,400	5,984,000	56,999,800	12,859,000	146,033,800
Apartments	16,801,400	366,163,600	10,469,800	20,882,400	171,941,000	84,992,600	671,250,800
Apartment Hotels	2,640,000	83,560,400	4,972,000	15,554,000	97,979,200	41,925,400	246,631,000
Club, Fraternal, etc.	7,231,400	70,010,600	1,515,800	13,191,200	66,704,000	15,987,400	174,640,400
Community and Memorial	3,421,000	21,232,200	1,529,000	5,711,200	17,047,800	11,710,600	60,651,800
Churches	21,142,000	55,105,600	22,770,000	23,859,000	69,885,200	20,409,400	213,171,200
Dwellings (Below $20,000)	10,936,200	83,540,600	6,791,400	11,215,600	40,198,400	24,314,400	176,996,600
Dwellings ($20,000 to $50,000)	10,346,600	38,445,000	5,935,600	7,629,600	37,470,400	15,085,400	114,912,600
Dwellings (Over $50,000)	6,749,600	43,443,400	5,555,000	5,662,800	25,348,400	12,837,000	99,596,200
Hotels	21,659,000	95,763,800	14,212,000	45,513,600	101,378,200	66,149,600	344,676,200
Hospitals	18,860,600	110,105,600	4,606,800	12,749,000	73,035,600	33,169,400	252,527,000
Industrial	20,295,000	130,191,600	15,661,800	35,846,800	154,671,000	28,789,200	385,455,400
Office Buildings	12,485,000	244,101,000	4,859,800	41,296,200	300,979,800	87,760,200	691,482,000
Public Buildings	15,518,800	185,924,200	6,226,000	18,499,800	87,353,200	27,689,200	341,211,200
Schools	44,811,800	165,499,400	13,010,800	60,152,400	256,326,400	57,981,000	597,781,800
Stores	6,366,800	78,876,600	4,477,000	7,926,600	55,497,200	23,324,400	176,468,600
Theaters (All Types)	6,303,000	62,891,400	3,746,600	7,812,200	74,032,200	8,773,600	163,559,000
Welfare Y. M. C. A., etc.	10,799,800	48,100,800	5,077,600	13,666,400	31,858,200	4,644,200	114,147,000
TOTAL VALUE OF NEW BUILDINGS	$266,567,400	$1,978,400,600	$140,012,400	$363,822,800	$1,775,028,200	$592,941,800	$5,116,773,200

New Construction Under Architect's Supervision..... $5,116,773,200

Buildings of All Types—Excluding Public Works and Utilities—Not Designed by Architects..... 2,192,020,000
(Estimated from Averages of Previous Years)

TOTAL ESTIMATED CONSTRUCTION FOR 1929..... $7,308,793,200
(Exclusive of Public Works and Utilities)

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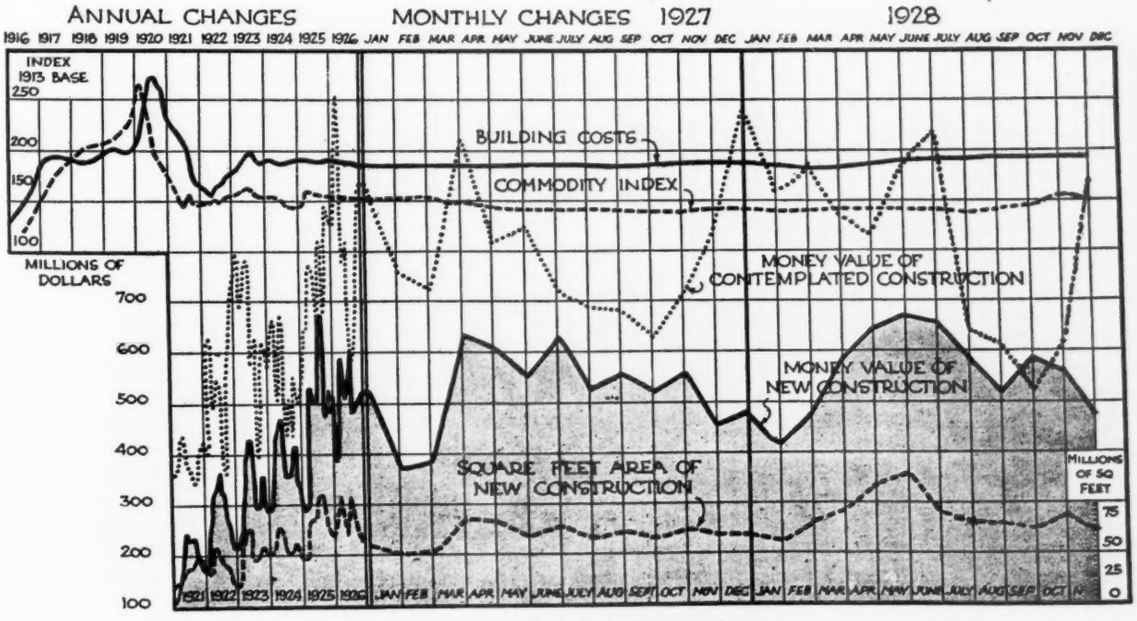
DETAILED FORECAST *of* NEW BUILDING CONSTRUCTION *for* 1929


ANNUAL CHANGES
MONTHLY CHANGES 1927
1928
1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926
JAN FEB MAR APR MAY JUNE JULY AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUNE JULY AUG SEP OCT NOV DEC
INDEX 1913 BASE
250
200
150
100
BUILDING COSTS
COMMODITY INDEX
MILLIONS OF DOLLARS
700
600
500
400
300
200
100
MONEY VALUE OF CONTEMPLATED CONSTRUCTION
MONEY VALUE OF NEW CONSTRUCTION
SQUARE FEET AREA OF NEW CONSTRUCTION
MILLIONS OF SQ FEET
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1921 1922 1923 1924 1925 1926 JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC JAN FEB MAR APR MAY JUNE JULY AUG SEP OCT N

THE BUILDING SITUATION

The various index lines are designated on the chart, which is developed from reports of the United States Department of Commerce, the F. W. Dodge Corporation, and *The Engineering News-Record*

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BUILDING ACTIVITY *in the* UNITED STATES SINCE 1916

Mississippi River Improvement Work Aids Stone Producers

WITH 1928 a record production year for the Edward Hely Stone Co., in South Cape Girardeau, Mo., the present prospects for business during the coming year already equal the production established during 1928, according to Norman L. Hely, owner and manager.

Approximately 100,000 tons of stone, or 30% more than was crushed in 1927 at the plant, was shipped during 1928. In addition to this record output for the plant, the company's year was featured by a government contract and agreements with contractors doing federal government rip-rap work along the Mississippi river, which open up a new production field at the Hely quarries. The result was that the "blue hole," famous for years as a bathing place for Girardeauans, was pumped dry and a rip-rap quarry was established apart from the regular quarry where the company obtains its supply of rock for crushed stone.

A loading dock has been erected on the Mississippi river near the company's grounds and rip-rap material is loaded from this on to barges, which transport the rock to river projects between St. Louis and Memphis, Tenn. More than 25,000 cu. yd. of this rock has been shipped since the work in the new quarry began last August.

Another interesting phase of the company's production last year was the shipping of 8000 tons of crushed stone to Tennessee to be used in highway construction in that state. The first river shipments of the company were made in the late summer. The company hopes to do better than double the rip-rap business this year. Business in sight for crushed stone also indicates that this year's output will be much greater than that of last year, Mr. Hely said.—*Cape Girardeau* (Mo.) *Missourian.*

Law Barring Quarries Near Homes Held Void

THE MISSOURI SUPREME COURT en banc recently declared unconstitutional that part of an ordinance of the city of St. Louis which prohibits the opening or operation of a stone quarry within 300 ft. of a residence, in ordering the discharge of Roger Davison on a writ of habeas corpus.

The court held the establishment and operation of a quarry was not shown to be a nuisance, and that restrictions in this respect were not constitutional.

The decision does not affect other provisions of the ordinance which prohibit the operation of brick kilns, slaughter houses, tanneries, garbage works, soap, glue, candle or vitriol factories within 300 ft. of a dwelling or buildings used for public purposes.

Mr. Davison was charged with establishing a rock quarry in St. Louis, within 300 ft. of property in the two blocks between Drury Lane and Wellington Court, and Manhattan and Leamington boulevard. He was convicted in police court and appealed to the St. Louis court of criminal correction, where the conviction was sustained and a fine of $100 imposed. He refused to pay the fine and filed an application in the supreme court for a writ of habeas corpus, charging that he was being held illegally under a law that was invalid.

Judge N. T. Gentry, who wrote the opinion, held the owner of property had the right to use it in any manner he sees fit, consistent with the rights of others, and that the question involved was the right of the city to prohibit the use of the property for a purpose that was not shown to be a nuisance, and not injurious to the health, morals or safety of the public.

"We know of no injury that would result to any one by reason of the opening up of a stone quarry, unless the operation was accompanied by blasting," Judge Gentry said. "While the use to which a man may put his property may be restricted or regulated by the state, in the exercise of its police power, so far as may be necessary to protect others from injury from such use, it is of course elementary that the enjoyment of one's property cannot be interfered with or limited arbitrarily."

Roger Davison and his business associate, Otis C. Provost, touched off a blast in this quarry on June 15, to make a test case. Neighbors, who favored the prosecution, complained that they had been disturbed for some time previously by blasts at the quarry. —*St. Louis* (Mo.) *Post-Dispatch.*

Abandoned Quarry to Be Used as Playground

THE ABANDONED quarry sites in the Hook Mountain section of Palisades Interstate Park, New York, are undergoing reconstruction work under supervision of park officials which will reclaim them for recreational purposes, according to an announcement of the park commissioners. The work will be completed by next summer.

Besides improvement of roads and highways, making the resort section more accessible, one quarry with a floor more than 100 ft. long and 400 ft. in breadth is being smoothed for athletic fields, picnicking and playgrounds. Loading piers and other structures used in the crushing and shipping of rock will be adapted for park purposes, and the 75-ft. wharf is capable of accommodating the largest of the excursion steamers. The mile-long beach at the quarry will enhance the site as a resort and vacation ground, and for this purpose bath houses, shelters, tables and benches are being constructed.

One section of the quarry district was opened last summer and the added facilities for the next season will accommodate thousands more than used the park last year.—*New York* (City) *Times.*

Steel and Cement

(An editorial in Iron Age)

FIFTEEN years and more ago there seemed to be a race between fabricated structural steel and portland cement, but despite the great vogue of concrete road building fabricated structural steel has been coming ahead in the general totals. The tonnage of fabricated structural steel gained approximately 162% from 1913 to 1928, while shipments of portland cement increased only 95%.

A convenient comparison is made by dividing the number of net tons of fabricated structural steel into the number of barrels of portland cement. This comes out at 73 bbl. of cement per ton of steel in 1913, but only between 52 and 59 bbl. in any of the past six years. Last year showed about 55 bbl., or approximately the average of the six years.

Portland cement had a backset during the war and scarcely any gain in the first three years thereafter. Then it gained sharply, 1927 being 45% over 1922; but 1928 brought only 2% gain over 1927.

Precise comparisons are impossible because the fabricated structural steel statistics are revised somewhat from time to time. Using the latest revised figures, the record year until 1928 in actual shipments by the structural steel fabricating shops (not the bookings) was 1925, with 3,014,980 tons. The next two years show a trifle under 2,900,000 tons each, while 1928, with December estimated, may be set at 3,185,000 tons, thus gaining 5% over 1925.

Of course the use of cement is an advantage to steel so long as it does not displace steel. It involves much steel reinforcement, both in building construction and in road building. Mesh reinforcement in road building is not uncommon and it is now standard practice in many places to separate the two halves of a road by thin steel, either blue annealed sheet or strip.

If it were possible for the people to spread out more or less uniformly over the three million square miles of area of the United States, fabricated structural steel would have less vogue and cement would have more; but we find we cannot do that. Rural population is nearly stationary, almost the entire population increase being urban. The result is buildings of greater and greater size, bigger and bigger bridges, and more and more subways.

Annual statistics show that there have been no bulges in fabricated structural steel construction, but rather a steady movement; and scrutiny of the individual jobs brings out the wide variety of the work done whereby fluctuations in individual classes of work tend to average out in the year's total. As the entire fabricated structural steel shipments reported represent only about 8% of the total steel made, annual variations in the amount cannot greatly affect the steel producing industry as a whole.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Increased Profits Through Efficient Use of Equipment

By M. R. Bowers

PRODUCTS MEN are gathering once again in leading concrete masonry centers of the country to "listen in" on the sales conferences developed by the Cement Products Bureau of the Portland Cement Asociation. These conferences are the result of careful surveys conducted in 1927 and 1928 which showed the exact status of the industry. Manufacturers are doing more than "listening in." They are themselves taking a very active part in the round table discussions following the two hour presentation of the material which covers many problems confronting the industry.

Primarily arranged to assist the increased merchandising activities of block producers, and emphasizing personal selling as the key to successful merchandising, these conferences are also bringing to light some interesting ideas on plant production. The present day concept of merchandising takes in a much broader field than formerly was the case. Merchandising starts at the plant with the manufacture of a quality product that can be put on the market at a favorable price. The next step is in the sales work in marketing the article and the final step is in the follow-up with satisfactory delivery and services to the customer, which has the effect of building up repeat sales. This broad interpretation of merchandising which demands a quality product as a first essential is causing leading manufacturers to center their attention on economical production as a first step in promoting sales.

In the past much time and effort was devoted to study and research of raw materials that go into the manufacture of concrete block and tile in an effort to develop a quality product. Proper grading, proportioning, mixing and curing methods were studied with the result that the majority of plants today are producing a product of guaranteed high standard quality. When this was accomplished architects and builders were quick to recognize the merits of concrete masonry as a satisfactory building material. This represents true progress within the industry, but there is still considerable work to be done before certain problems of production can be solved.

The economic pressure of present day competition is so great that no individual manufacturer or entire industry can afford to miss any opportunity to improve upon the manufacturing and selling operations that are now in use. So much has already been spoken and written on this subject of competition that it is not necessary to go into the wheres and whys of it now. Everyone knows it is here and realizes that definite steps must be taken to meet it.

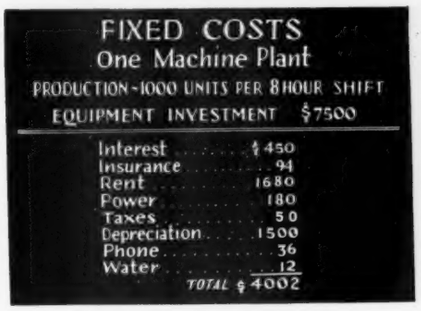


Fig. 1—Fixed costs

A great deal more personal selling effort is needed and it is trained personal selling that will enable the industry to forge ahead on a profitable basis during the next few years. Every contractor who uses or influences the use of concrete masonry should be seen frequently and regularly through personal calls. These calls can be made by the owner of the plant or by a full-time salesman hired by him. It is not so important which of the two do it so long as the calls are actually made.

Immediately the question arises in the minds of most manufacturers: where will I get the money to pay for this personal sales work? At the present stage of development the answer to this seems to be, *reduce the fixed costs in production* and pay for a salesman with the savings. This brings in the interesting subject of *multiple shift operation.*

Economies of Multiple-Shift Plant Operation

I shall follow the procedure used in the present series of sales conferences by taking a one machine plant capable of turning out 1000 units per 8-hour shift. Looking at chart (1) illustrated in this article it is seen that a machine, pallets, motors and other equipment for the plant cost about $7500. The building and grounds are rented. This same chart shows the fixed costs for this plant as follows:

Interest at 6% on the investment, $450.

The average insurance premium, according to insurance men, is charged at $1.25 per 100, making a total of $94.

Experience shows the average rent for a block plant of this type to be $140 per month or $1680 per year. This includes real estate, taxes, fire insurance on the buildings, depreciation, maintenance and repairs on the buildings, and interest on the investment in real estate. This item of rent must be charged off on fixed costs even if the building and grounds are owned by the block producer.

Electric service companies must be equipped to supply power to their customers whenever it is needed. Therefore they have what is called a "ready-to-serve" rate or a minimum charge of $1 per horsepower per month, whether any power is used or not. The minimum charge for the 15-hp. motors in this plant would be $180 per year.

The tax receipts of numerous products plants shows a fair average rate to be $1 per 100 on two-thirds of the valuation of equipment. On $7500 this would be $50 per year.

Equipment will depreciate through obsolescence even when standing idle. A fair average allowable charge for depreciation is 20%. On this plant this would amount to $1500.

Similar to power, there is a minimum

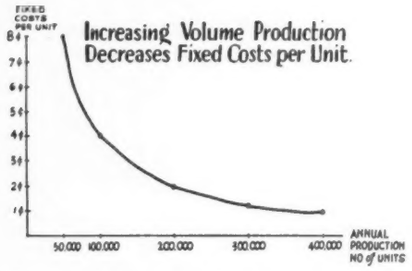


Fig. 2—Effect of volume on fixed costs

charge for telephone service at $3 per month or $36 a year, and $12 a year for water.

This makes a total fixed charge of $4002 on this plant that must be met whether any masonry units are produced or not. Each unit produced must bear its individual share of these fixed costs. The problem is to reduce these fixed costs enough to meet the costs of employing personal salesmanship during the year.

Examination of chart (2) shows that if a certain number of units, say, 50,000, have to carry a fixed charge of $4002 or 8c. per unit, twice that number of 100,000 units would carry a charge of 4c. each, provided no additional equipment is purchased to produce them. And so the story goes, each additional 100,000 units produced cuts the fixed costs to half of what they were before. Additional equipment, however, will automatically send these costs upward.

To get twice the production out of a plant without increasing the equipment requires that present equipment must be used twice as many hours. One man could not work 16 hours straight, day in and day out, without losing both his efficiency and health. However, two men working an 8- or 9-hour shift per day would keep the plant operating twice as long and twice the number of units would be produced. This is known as multiple-shift operation, which is being practiced by several large industries today.

Chart (3) pictures the concrete products industry under multiple shift operation. The left hand line shows the percentage operating capacity, while the lower line indicates the number of shifts operated during the year. If the one machine plant already mentioned was operated 8 hours a day, 6 days a week for 52 weeks, excluding Sundays and holidays it would be running about 300

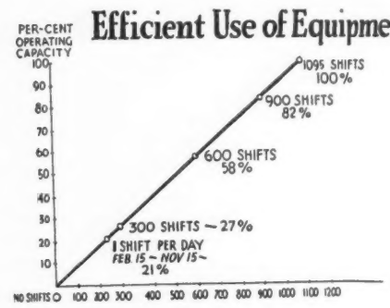


Fig. 3—Relation of operating captcity and efficient use of equipment

shifts, producing 300,000 units at a fixed cost of 1⅓c. per unit. There are many products plants operating on this basis which is about 27% efficiency. By adding another crew to work the same number of hours, days and weeks, the number of shifts, production and efficiency would be doubled and the fixed costs would be 0.6c. per unit or a saving of 3.4c. per unit when the plant only produced 100,000 units at a fixed cost of 4c. per unit. The saving would be more than adequate to pay for a salesman and for advertising to back him up.

There are many block men who are skeptical of multiple shift as a means of cutting costs and hiring salesmen with the saving, yet there are alert block producers in various parts of the country successfully using it. It is pretty much a question of getting full value out of equipment representing capital investment or of wearing machinery out rather than allowing it to rust out and become valueless through obsolescence.

This idea is not new, nor is it theoretical. The steel industry found it could not continue in business if it did not make full use of its tremendously expensive equipment and for a number of years it has been operating on a multiple-shift basis. The automobile industry reached the same decision. A recent newspaper clipping states that Henry Ford plans to add 30,000 more men in order to run his plants six days a week and still maintain the five-day week schedule for his employes. Mr. Ford has inaugurated many new ideas on employment and management in his plants and it is his belief that long hours, while injurious to his men, are not harmful to his machines. It was found that with the five-day week production dropped off enough to cause fixed costs to rise at the plants and for that reason he is going back to the six-day week. Multiple shift operation has been used at the Ford plants during the five-day week with satisfactory results.

The concrete products industry, capitalized at over $100,000,000 and doing an annual business of $70,000,000, is at a stage in its development where it can well afford to profit by the experience of other large industries in the country. Multiple-shift operation is not only essential, but successful in the business of making steel and automobiles. It should be successful likewise in the business of making concrete building units.

Ohio Products Manufacturers Discuss Many Business Subjects

Employers' Liability Insurance Rates, Building Codes and Market Possibilities Are Some of the Subjects Considered

By K. E. Friel
Assistant Secretary, Ohio Concrete Products Association

ALTHOUGH the attendance at the eighth annual convention of the Ohio Concrete Products Association, held at the Deshler-Wallick hotel, Columbus, Ohio, January 30, 31 and February 1, was small, compared to the actual number of products plants throughout the state, much enthusiasm was shown and we are glad to say that more was accomplished at this meeting than ever before in the annals of the association.

Mayor J. J. Thomas, of Columbus, and President ***S. I. Crew,*** of the Ohio Concrete Products Association, gave the welcoming addresses, which were followed by a talk on "Standards Recommended by Underwriter's Laboratories," by G. B. Mulbaur, general agent, Underwriter's Laboratories, Chicago.

"Cooperation" was the next interesting address by ***A. B. Braden,*** of the Columbus Testing Laboratories. Mr. Braden brought out that cooperation is talked about very much, but it really turns out in a great many cases to be competition. If cooperation is to take the place of competition, one has to cooperate on angles that do away with competition. In other words, you cannot make products of various qualities and expect to cooperate and at the same time compete because it can't be done. The man who makes a poor product is not cooperating with the man who makes the good product. The cooperation in societies and organizations, whether local or state-wide, can only be brought about by educating all the people in the industry as to what good products are, how good they should be to be known as good products, and for each man in the organization to try and live up to that standard.

Reducing Workmen's Compensation Insurance Rates

A subject in which every products man is interested was discussed next by ***I. E. Evans,*** actuary of the Ohio Industrial Commission on "Ways and Means of Reducing Compensation Premiums." Mr. Evans told the members that every employer who has three or more employees is required to carry workmen's compensation insurance and pay a premium into the Ohio State Insurance Fund or to the Industrial Commission. The Industrial Commission is the operating body

of the Ohio Workmen's Compensation Law.

The employer usually has the impression, since this fund is operated by the state, that it is a form of taxation, that you have to pay a certain amount of premium because you are doing a certain kind of business. The point brought out is that you don't pay a premium necessarily because you are engaged in the same kind of an industry. You, to a large extent, make your own rate. He advised that there are around 42,000 employers in the state of Ohio who are paying into that fund. There is now about $53,000,000 on hand in cash. The reason for this amount is due to the fact that the workmen's compensation law provides that the injured workman shall not get benefits in large amounts, that he shall get it only as he was accustomed to get his wages heretofore before he was injured. This money doesn't belong to us, doesn't belong to the employers of Ohio, while they are the ones who built it up, nor does it belong to the Industrial Commission. It belongs to 5000 families where the head of the family has been killed; to 30,000 families where the man has lost both eyes, both feet or both hands. He will get compensation as long as he lives. And it also belongs to thousands of employes who are in different stages of recovery. In other words it is a trust fund.

In arriving at the rate the industry is separated into various classifications and each year a rate is made for the group based upon the average experience of each one of the groups. By experience he referred to premiums, payroll and what was done in the way of injuring the employes and what it would cost the Industrial Commission to take care of them. Each employer is then judged as to his individual business as compared to the standard of the average to determine his rate.

In concluding Mr. Evans gave some figures indicating the experience with concrete products manufacturers in the last five years under workmen's compensation. They had in the five years a payroll exposure of $6,250,000. They collected in premiums from this group $73,741. Products manufacturers caused losses or claims to the extent of $106,924. Or, they are "in the red"$31,000. Therefore, each one, to a large extent, is controlling his own rate, his own individual rate, as well as the rate of the industry. Mr. Evans said that they hoped to provide an incentive for each of the products men to reduce the rate and pay dividends to each one in proportion to what he does, but it will also serve to keep the group as a whole working together.

Building Codes

F. Leo Smith, member, Board of Building Standards, Columbus, gave a general discussion of the "Ohio State Building Code." He said: "Some eight years ago—I think this is the eighth convention that you have had, I was approached on the subject of talking to the concrete-block manufacturers on concrete block and the building code, and at that time, I said, they are making a product that hasn't any standing at all with the architects and the engineers of the country and if I do talk to them they won't be very glad to hear what I have to say. Nevertheless they prevailed upon me to come over and I told them some rather unpleasant things about their product, and I believe that I told them the truth.

I am glad to say that since that time through the efforts of this organization, and the individuals in it, that the block industry and the manufacturers of cement products of various kinds have improved to the point where building officials, architects and engineers and the public generally are beginning to recognize that it is possible to make a quality product in concrete. We still hear considerable criticism of concrete products and some of that criticism dates back to the day when they were making an inferior material. I know we encounter that opposition quite frequently in our board and committee meetings in connection with our proposed revisions of building legislation on this subject."

Mr. Smith also reviewed the history of the state building code starting about 1865 up to the present time and its relation to the concrete block business. He also pointed out the evils of the individual block manufacturer who allows poor blocks to be made and used and stated that "the establishing of standards for concrete building units has been a great step forward so far as statutory law is concerned in controlling this situation."

Market Possibilities

Virgil Overholt of the agricultural engineering department, Ohio State University, made a few comments upon the possibilities of concrete on the farm. Mr. Overholt pointed out that very few Ohio farms have septic tanks. If septic tanks could be placed on one-third of Ohio farms, it would make a market for about 320,000 bbl. of cement. He also told the members that the biggest problem in poultry production today is poor housing; also he showed the need for improved stable conditions; milk houses; farm homes; concrete feed lots; walks; drainage; silos; all of which, could be built of concrete. Therefore, taking the sum total of the possibilities of extending the uses of concrete on the farm, the above simple items will run up to way over 5,000,000 bbl. of cement, and probably not more than half the possible uses of concrete on the farm have been mentioned.

Aggregates

R. S. Frame, civil engineer, American Aggregate Corp., Columbus, gave a very interesting address on "Sand and Gravel." Mr. Frame said that the principal characteristics of aggregate, that affect the quality of concrete are: (1) Cleanness; (2) durability; (3) grading; (4) uniformity of grading. He further stated that the first essentials of an aggregate are that it be clean and consist of durable particles. Cleanness consists of freedom .from harmful amounts of impurities, particularly such as clay and silt. Durability consists of freedom from harmful amount of soft and friable particles which will break up readily under stress and abrasion and which will disintegrate in the weather. If an aggregate does not meet the requirements of cleanness and durability it is worthless, regardless of its other properties.

Well graded aggregates are essential to the production of economic concrete, he said. Even though the aggregate consist of clean and durable particles, if it is poorly graded either a concrete of low strength will be obtained or an excess of cement must be used. Uniformity in grading is essential to the production of uniform concrete. If the grading varies from batch to batch the quality of the concrete will vary in proportion, unless each mixture is proportioned differently, which is obviously impossible. Consequently if a mixture suitable to the average grading is used, some of the batches will be much lower in quality than required, while others will be higher in quality than necessary. To overcome this it is necessary to use as much cement as is required for the poorest grading, which results in most of the concrete being of much higher quality than required and a consequent waste in cement.

Mr. Frame went on to say that the outstanding advantages which can be claimed for gravel as a class are workability, ease of handling and yield. If consideration of the quality of the individual particles of the aggregate is eliminated, the principal items of advantage of gravel over other aggregates from a plant with equal facilities for furnishing a prepared material, seem to be the following:

1. The rounded particles of gravel and the fact that it is well graded from fine to coarse, make a concrete of greater density and higher yield and consequently of greater economy.

2. The rounded particles of gravel produce a more workable mix and consequently one which can be handled more economically and with less mixing water.

3. The greater workability of gravel in concrete permits the use of a smaller quantity of mixing water and has the effect of producing higher strengths in gravel concrete than in concrete of the same proportions made from crushed materials.

Light-Weight Aggregates

W. D. M. Allen, Manager Cement Products Bureau, Portland Cement Association, Chicago, addressed the assembly on the subject of "Light Weight Building Materials."

He began by quoting some statistics which

gives a picture of how the concrete products production and concrete masonry production has increased. The per capita consumption increased from 2.9 block in 1927 to 3.2 block in 1928. During the past year 39 plants produced over a million, 59 produced over 750,000, 34 others produced over 500,000 and 224 others produced over a quarter of a million. In other words, 356 plants, representing 8.4% of the total number of plants, produced 205 million block or 50% of the total production.

Mr. Allen believes that undoubtedly the greatest progress made was in the light-weight aggregate field. He said, "I think the concrete masonry business has practically switched around in the last two years in its thinking about the quality of products, or what constitutes quality in products. We thought here up until two years ago, or a majority of us at least, considered concrete block, building tile and brick from the standpoint of strength and density and we laid a great deal of stress on density, low absorption. At the present time I think the majority of the larger manufacturers are thinking more in terms of porous units, units that are not dense, units that are just the reverse of dense, because we found that as we get above the foundation group or class of building the principal requirements that we meet in our products are first, strength; next, fire resistance; then, heat insulation and sound insulation. I don't know that the order there could be justified, but those are your four principal requirements for masonry units about grade. We don't think anything about having a block now with a 25 or 30% absorption. Lightness of weight is associated with other advantages in concrete masonry, sound insulation, heat insulation and ease with which they can be manufactured, transported and laid. There is far less opposition on the part of the bricklayers to laying up the light weight units, a unit that weighs between 25 and 30 lb. as compared with one that weighs 45 to 55 lb. for the same amount of wall volume. Cinder blocks have shown a great development along the east coast, principally in New Jersey, New York and Philadelphia. Through the central west the thing that has caused the most comment is the burned clay or shale aggregate, "Haydite," that has been a life saver for the concrete products business in certain places. At the same time there is a water-cooled slag that is being experimented with quite a little bit. I think that we have got to study that pretty carefully and make progress slowly with that material because there have been a number of bad experiences in the past using water cooled slag, but it indicates a tendency in the direction of light weight materials.

In Montreal, and in Boston, a little bit in New York and some in Chicago and I imagine in other sections, they are developing an "Aircrete" block, which is a mixture of cement and water and a small amount of sand, the proportion of sand varies, with an aluminum powder that is added that causes the whole thing to puff up and form a very light-weight material, in its lightest form weighing probably not more than 30 lb. per cu. ft. The most of the structural aircrete, though, I think weighs around 40 to 45 lb. per ft. That stuff is being cast in blocks and used for partitions, for floor slabs and to some extent for backup and roof slabs.

"Bubblestone" is another light-weight concrete which is made by beating up sort of a batter first, it is very fine bubbles made of sort of a gelatine material that holds its form for a certain length of time, and those bubbles are mixed in a very soupy slurry of cement and water and the bubbles will hold their form until the mortar begins to dry, and as it dries, by the time it is dry or hardened the mortar will keep its own form. That material is not making very rapid progress because of the slowness with which it hardens, you have to use such an excess of water. The strength that they are getting is relatively low.

Better Merchandising

Mr. Allen continued by saying that it is generally agreed throughout the industry that one of the biggest questions to be met is better merchandising, and after this has been satisfactory disposed of, there will remain a lot of technical problems to solve, such as shrinkage, resulting in serious cracking.

Selling

J. R. Snowball, of the Crew Builders' Supply Co., Cincinnati, Ohio, and ***E. W. Dienhart,*** of the Hydraulic Pressed Brick Co., Cleveland, Ohio, gave some personal experiences they had had in the selling field of concrete products, which brought out the need of honest business and good salesmanship.

Officers

S. I. Crew, Crew Builders' Supply Co., Cincinnati, president; ***Frank A. Owen,*** Owen Cement Products Co., Akron, vice-president; and ***G. M. Friel,*** Columbus, secretary-treasurer, were re-elected by unanimous vote.

Banquet and Entertainment

The newly elected governor, Myers Y. Cooper, was guest of honor at the annual banquet on Thursday evening, and gave a very interesting address before approximately 150 guests. Charles Milton Newcomb, toastmaster, of Delaware, Ohio, made the concluding speech on a topic, "The Physcology of Laughter." The guests were entertained during the evening with vaudeville and dancing sponsored by the Columbus Concrete Products Association.

Friday afternoon the session adjourned after deciding that the convention would meet next year in January in Toledo, Ohio.

Man Smothered to Death After Fall Into Sand Hopper

HARRY E. MINSINGER, brother of the president of the Star Sand Co. of Portland, Ore., was smothered to death in a sand hopper at Albina on January 23. It is understood that Mr. Minsinger was shoveling sand at the top of the hopper when a slide of sand caused him to lose his footing and slip into the bin. It was an hour before workmen could get him out from under the weight of sand which covered him, and then the efforts of the resuscitation squad failed to revive him. Charles E. Minsinger is the brother who heads the Star company.—*Portland* (Ore.) *Journal.*

Arkansas Sand and Gravel Co. to Open New Plant

EQUIPPED to remove approximately 1000 yd. of sand daily from the Arkansas river, the new plant of the Arkansas Sand and Gravel Co. soon will be ready for operation at Pine Bluff, Ark., according to a recent announcement of Marvyn Jones, one of the officials of the company. Practically all of the equipment which will be used by the plant has been placed on the ground and the construction men are through with the erection of plant buildings.

The company now is having a pontoon system built which will lead from the sand bins to the dredge, and sand will be pumped from the river and forced to the top of the plant through a line of 10-in. pipe 800 ft. long, thus doing away with the necessity for loading and reloading from barges. The same centrifugal pump which removes the sand from the river will force it through the 800 ft. of pipe to the bins.

Frank R. Allen of Pine Bluff and R. W. Crimm of Kansas City are the other members of the Arkansas Sand and Gravel Co. The company will do a general business of selling sand, gravel and other materials used in road building. It is incorporated for $50,000.—*Pine Bluff* (Ark.) *Commercial.*

F. J. Griswold Leaves American Gypsum Co.

ACCORDING to a recent announcement in Port Clinton, Ohio, papers, F. J. Griswold has resigned as general manager of the American Gypsum Company of Port Clinton, the resignation becoming effective on the first of February. Mr. Griswold had been with the gypsum company at this location for twenty-two years, it is stated. John A. Kling of Cleveland, chairman of the board of directors of the company, has stated that Fred Wolf, the general superintendent, will carry on the duties of general manager until a successor can be named. Arthur Black will continue as sales manager, Mr. Kling stated. Mr. Griswold has not announced any of his plans for the future.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.	.....	1.30	1.10	1.00	1.00	.....
Frederick, Mo.	.50– .75	1.35–1.45	1.15–1.25	1.10–1.20	1.05–1.15	1.05–1.10
Ft. Springs, W. Va.	.40	1.25	1.25	1.25	1.15	1.15
Munns, N. Y.	.75	1.25	1.25	1.15	1.00	.....
Prospect, N. Y.	.85	1.15	1.15	1.15	1.15	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.75	1.35–1.45	1.15	.95	.90	1.00
Syracuse, N. Y.	.50	.....	1.00	1.00	1.00	1.00
Walford, Penn.	.....	.....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
West Chester, Penn.	5.00g	.....	.....	.....	.....	4.00k
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.....	.....	.....	.....	.50	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Columbia and Krause, Ill.	1.05–1.40	.95–1.50	1.15–1.50	1.05–1.50	1.05–1.50	.....
Cypress, Ill.	.90–1.15	.90–1.15	1.00–1.15	1.00–1.20	1.00–1.15	1.00
Davenport, Iowa (f)	1.00	1.50	1.50	1.30	1.30	1.40
Dubuque, Iowa	.95	1.10	.....	1.10	1.10	.....
Stolle and Falling Springs, Ill.	1.05–1.40	.95–1.50	1.15–1.50	1.05–1.50	1.05–1.50	.....
Greencastle, Ind.	1.25	1.05	1.05	1.05	.95	.95
Lannon, Wis.	.90	1.00	1.00	.90	.90	.90
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.	.....	.90–1.00	1.00–1.10	.90–1.00	.85– .90	.85– .90
Northern Ohio points	.85–1.15	1.25	1.15	1.15	1.15	1.15
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	.75	.....	1.10	1.05	1.00	.....
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.10	1.70	1.70	1.70	1.70	1.70
Toronto, Canada (m)	.45	.95	.95	.80	.80	.80
Valmeyer, Ill. (fluxing limestone)	.90–1.20	.....	.....	1.75	.....	1.75
Waukesha, Wis.	.....	.90	.90	.90	.90	.90
Winona, Minn.	1.00	1.20	1.30	1.40	1.40	1.40
Wisconsin points	.50	.....	1.00	.90	.90	.....
Youngstown, Ohio	.70j	1.25l–1.35h	1.25l–1.35h	1.25l–1.35h	1.25l–1.35h	1.25l–1.35h
SOUTHERN:						
Cartersville, Ga.	1.20	1.65	1.65	1.45	1.15	1.15
Chico, Texas	1.30	1.25	1.20	1.10	1.00	.95
Cutler, Fla.	.60r	.....	.....	1.75r	1.10r	.....
El Paso, Texas	.50– .75	1.00–1.25	1.00–1.25	1.00	1.00	1.00
Graystone, Ala.			Crusher run, screened, $1 per ton			
Olive Hill, Ky.	1.00	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.25	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs and Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.00	1.25	1.25	1.25	1.00	.....
Rock Hill, St. Louis, Mo.	1.00	1.25	1.25	.90–1.25	.90–1.25	.90–1.25
Sugar Creek, Mo.	.75	1.00	1.20	1.20	1.20	1.20

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.75	1.25	1.25	1.25
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.45	1.40–2.20	1.80–2.00	1.40–1.60	1.40–1.60	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Spring Valley, Calif.	.90–1.25	.90–1.25	.90–1.25	.90–1.25	.90–1.25	.90–1.25
Springfield, N. J.	1.40	2.00	1.90	1.60	1.60	.....
Toronto, Canada (m)	.....	1.95	2.45	.....	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Cayce, S. C.—Granite	.....	.....	1.75	1.75	1.60	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	1.00	.....	2.35	.....	.....	.....
Lithonia, Ga.—Granite	.75a	1.75b	1.75	1.35	1.25	.....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.	1.40	1.40	1.35	1.30	1.25	1.20

(a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¾ in., 1.45; 2 in. to ¾ in., 1.35. High calcite fluxing stone, 1.50. (g) Run of quarry. (h) Less 10c discount. (j) Less 10% net ton. (k) Rubble stone. (l) Less .05. (m) Prices at quarry. Extra charge for freight to Toronto. (n) Crusher run for ballast, .85. (p) Carloads prices. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cubic yard.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 100 mesh	4.50
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton, Penn.—Analysis, 94.89% $CaCO_3$; 1.5% $MgCO_3$; 50% thru 100 mesh	3.50–5.00
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh	1.50
Pulverized, per ton	2.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Cypress, Ill.—Analysis, 95% $CaCO_3$, 2% $MgCO_3$; 90% thru 100 mesh, 1.35; 50% thru 100 mesh, 1.15; 90% thru 50 mesh, 1.15; 50% thru 50 mesh, 1.05; 90% thru 4 mesh, 1.10; 50% thru 4 mesh	1.00
Danbury, Conn., and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$; 5% $MgCO_3$; fine ground, 90% thru 100 mesh; bulk	3.50
Paper bags	4.75
100-lb. cloth bags	5.25
(All prices less .25 cash 15 days)	
Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 200 mesh, bags, per ton	6.00
90% thru 20 mesh, bulk, per ton	1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags	3.95
Bulk	2.70
Jamesville, N. Y.—Analysis, 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags, 4.25; bulk	2.75
Joliet, Ill.—Analysis, 52% $CaCO_3$; 48% $MgCO_3$; 90% thru 100 mesh	3.50
Knoxville, Tenn.—80% thru 100 mesh; bags, 3.95; bulk	2.70
Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk	1.75
Marl—Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk	2.25
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh	4.00–4.50
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35–1.60
Olive Hill, Ky.—Analysis, $CaCO_3$ 94-98%; 50% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 101.12%; 99% thru 10, 60% thru 50; 45% thru 100	2.50
100% thru 10, 90% thru 50, 70% thru 100; bags, 5.00; bulk	3.50
100% thru 4, 30% thru 100, bulk	1.50
Rocky Point, Va.—Analysis, $CaCO_3$, 97%; $MgCO_3$, 75%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Watertown, N. Y.—Analysis, 53.72% $CaCO_3$; pulverized; sacks, 4.25; bulk	2.75

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1%. $MgCO_3$; 90% thru 10 mesh	1.50
30% thru 100 mesh	1.50

(Continued on next page)

Agricultural Limestone

Chico and Bridgeport, Tex. — Analysis, 95% $CaCO_3$; 1.3% $MgCO_3$; 50% thru 4 mesh	1.00
Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 10 mesh, per ton	1.25
90% thru 4 mesh, per ton	1.10
Dubuque, Iowa—Analysis, 54% $CaCO_3$; 38% $MgCO_3$; crusher run rescreened	.85
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Spring, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.50
Kansas City, Mo.—50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Kokomo, Ind. —85% thru 10 mesh, 25% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags	5.00
Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh	1.10–1.70
Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.15
Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.10–1.70

Pulverized Limestone for Coal Operators

Davenport, Ia.—Analysis 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; paper sacks	6.00
Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill.—Analysis, 52% $CaCO_3$; 48% $MgCO_3$; 95% thru 100 mesh; paper bags (bags extra)	3.50
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks	4.25
Piqua, Ohio, sacks, 4.50-5.00; bulk	3.00–3.50
Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk	2.25–3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J.	*1.75–2.25
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.00
Klondike, Mo.	2.00
Massillon, Ohio	3.00
Michigan City, Ind.	.30– .35
Ohlton, Ohio	2.50
Ottawa Ill.	1.25
Red Wing, Minn.	1.50
Rockwood, Mich.	2.25–3.00
San Francisco, Calif.	4.00–5.00
Silica and Mendota, Va.	2.00–2.50
St. Louis, Mo.	2.00
Utica and Ottawa, Ill.	.75–1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.75
Dresden, Ohio		1.25
Eau Claire, Wis.	4.30	
Estill Springs and Sewanee, Tenn.	1.35–1.50	1.35–1.50
Franklin, Penn.		1.75
Massillon, Ohio		2.00
Michigan City, Ind.		.30
Montoursville, Penn.		1.25
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.		1.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N. J.		.55	1.15	1.50	1.40	
Attica and Franklinville, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00
Boston, Mass.†	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05	1.05	1.05
Erie, Penn.	.60	.85			1.25	
Leeds Junction, Me.		.50	1.75		1.25	1.00
Machias Jct., N. Y.	1.00	1.00	1.00		1.00	1.00
Milton, N. H.		.50				.90
Montoursville, Penn.	1.00	.80	.60	.60	.50	.50
Northern New Jersey		.50– .60		1.25	1.25	
Somerset, Penn.		2.00				
South Portland, Me.		1.25	2.75			2.25
Troy, N. Y.	.50– .75*	.50– .75*	.80–1.00*	.80–1.00*		.80–1.00*
F. o. b. boat, per yd.	1.50	1.50	1.75	1.75		1.75
Washington, D. C.	.55	.55	1.20	1.20	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.50	.35	.25	.45	.45	.50
Attica, Ind.			All sizes .75–.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.50	.35	.20	.50	.60	.60
Barton, Wis.		.40s		.65s	.65s	.65s
Chicago, Ill.	.50	.50–1.45n	.60	.60–1.55n	.60	.60–1.90n
Chicago, Ill.	.30	.20	.30	.40	.40	.45
Columbus, Ohio		.60	.60	.60	.60	
Des Moines, Iowa		.30		1.40	1.50	
Eau Claire, Chippewa Falls, Wis.		.55	.70	1.00	1.00	
Elkhart Lake, Wis.		.45	.50	.70	.70	.60
Ferrysburg, Mich.		.50– .80	.60–1.00	.60–1.00		.50–1.25
Grand Haven, Mich.		.60– .80	.70– .90	.70– .90		.70– .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00	1.00		1.00	
Hersey, Mich.		.50				.70
Humboldt, Iowa	.35	.35	1.35	1.35	1.35	1.35
Indianapolis, Ind.	.60	.60		.90	.75–1.00	.75–1.00
Mankato, Minn.		.45g		.60–1.25h	.70–1.25	1.25c
Mason City, Iowa	.50	.50	.80	1.25	1.25	1.25
Mattoon, Ill.			.75–.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.35	.35	1.25	1.25	1.25	1.25
St. Louis, Mo. (b)	1.30e	1.30f	1.55a	1.55	1.55	1.65
St. Louis, Mo.			†1.45t	†1.45u	†1.65v	†1.65
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.		.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.10	1.25
SOUTHERN:						
Brewster, Fla.	.50	.50				
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Eustis, Fla.		.45– .50				
Ft. Worth, Texas	1.00	1.00	1.25	1.10	1.00	1.00
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.00
Macon, Ga.	.65– .90	.65– .90	2.25–2.50	2.25–2.50	2.25–2.50	2.25–2.50
New Martinsville, W. Va.	1.10	1.00		1.30	1.10	.90
Roseland, La.	.30	.30	1.00	.80	.80	.80
WESTERN:						
Kansas City, Mo.	.70– .80	.70– .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10– .40	.10– .40	.50–1.00	.50–1.00	.50–1.00	.50–1.00
Oregon City, Ore.		All grades range from 1.00 to 1.25 per cu. yd.				
Otay, Calif.		.35– .40	.50– .60	.50– .60	.50– .60	.50– .60
Phoenix, Ariz. (k)	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.70	.60		.125		1.15
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			.40			
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.85
Burnside, Conn.		.75*				
Chicago, Ill.	1.25m			.35		
Des Moines, Iowa				.60		
Dresden, Ohio				.70	.65	
Eau Claire, Chippewa Falls, Wis.					.65	
Fort Worth, Texas						.70r
Gainesville, Tex.					.55	
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Macon, Ga.	.35					
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Roseland, La.				.60	.60	.60
Somerset, Penn.		1.85–2.00		1.50–1.75		
Steilacoom, Wash.	.25					
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.						.60
York, Penn.	1.10	1.00				

*Cubic yd. †Delivered on job by truck. (a) ⅝-in. down. (b) 1½- to ¼-in., 1.65. (c) 2½-in. and less. ‡By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Washed and screened river sand. (h) ¾-in. to ¼-in. (j) Lake sand, 1.75, delivered. (k) 60-70% crushed boulders. (m) Cu. yd., dune sand, f.o.b. cars, Chicago. (n) Cu. yd., f.o.b. cars, Chicago. (r) Pit run. (s) Plus 15c for winter loading. (t) Fine and regular binder. (u) Coarse, torpedo, also roofing. (v) Coarse binder. †2% discount if paid by 15th of month following delivery.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.75	2.75	2.75	.....	.....	.....	.....
Beach City, Ohio	1.75	1.75	.....	1.75	2.00	.....	.....
Dresden, Ohio	1.25–1.50	1.25–1.50	1.50–1.75	1.00–1.25	.....	.....	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	2.50–3.00	.....
Elco and Murphysboro, Ill.	Water-floated ground silica per ton in carloads—18.00–31.00						
Estill Springs and Sewanee, Tenn.	1.25	.....	.....	1.25	.....	1.35–1.50	.....
Franklin, Penn.	1.75–2.25	1.50–1.75	.....	1.75	.....	.....	.....
Kasota, Minn.	.....	.....	.....	.....	.....	.....	1.00
Kerrs, Ohio	1.10–1.50	1.25–2.00	2.00	.....	.....	2.75–3.00	.....
Klondike, Mo.	2.00	.....	.....	2.00	.....	.....	.....
Massillon, Ohio	2.50	2.50	2.00	2.50	2.50	.....	.....
Michigan City, Ind.	.....	.....	.....	.30–.35	.....	.....	.....
Montoursville, Penn.	.....	.....	.....	1.35–1.50	.....	.....	.....
New Lexington, Ohio	2.25	2.00	.....	.....	.....	.....	.....
Ohlton, Ohio	1.75	1.75	.....	2.00	1.75	1.75	.....
Ottawa, Ill.	1.25	2.25	2.25	2.25	1.25	3.50	2.00
Red Wing, Minn. (d)	.....	.....	.....	.....	1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50–5.00†	3.50–5.00†	3.50–5.00†	.....
Silica, Mendota, Va.	Potters sand, 8.00–10.00g						
Utica and Ottawa, Ill.	.40–1.00f	.40–1.00f	.75–1.00	.40–1.00f	.60–1.00f	2.23–3.25	1.00–3.25
Utica, Ill.	.60	.70	.....	.75	1.00	.....	.....
Warwick, Ohio	1.50*–2.00h	1.50*–2.00h	.....	1.50*–2.00h	.....	.....	.....
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.00	.....	.....

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (d) Filter sand, 3.00. (e) Filter sand, 3.00–4.25. (f) Crude and dry. (g) Also 12.00; building sand, 1.75–2.00. (h) Washed, 1.75.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Erie and Dubois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern New Jersey	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.00	1.25	.....	1.25	.....	.....	.....
Western Pennsylvania	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	.....	1.30*	.....	1.45*	1.45*	1.45*	.....
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1 05*	1.30*	1.45*
Toledo, Ohio	1.50	1.10	1.25	1.25	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	2.05*	1.45*	1.80*	1.45*	1.45*	1.45*	1.45*
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.90
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05	.55*	.....	1.15*	.90*	.90*	.....

5c per ton discount on terms. †1¼ in. to ¾ in., $1.05; ⅝ in. to 10 mesh, $1.25*; ⅝ in. to 0 in., .90*; ¼ in. to 10 mesh, .80*.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	12.00	.....	.....	.....	.....	2.00
Buffalo, N. Y.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Lime Ridge, Penn.	.....	.....	.....	.....	.....	.....	5.00	.....
West Stockbridge, Mass.	12.00	10.00	5.60	.....	.....	.....	.....	2.00[13]
Williamsport, Penn.	10.00–11.00	8.50–9.00	8.50–9.00	.....	7.00	9.00	5.00	.....
York, Penn., & Oranda, Va.	11.50[7]	8.50–9.50[7]	8.50–9.50[7]	8.50–10.50[7]	8.00	9.25	7.00	1.40[5]
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	.....	10.00	7.50	.....
Carey, Ohio	11.50	7.50	7.50	.....	8.00	.....	8.00	1.50
Cold Springs, Ohio	.....	7.50	7.50	.....	.....	.....	.....	.....
Gibsonburg, Ohio	11.50	.....	.....	.....	8.00	10.00	.....	.....
Huntington, Ind.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Luckey, Ohio	11.50	.....	.....	.....	.....	.....	.....	.....
Milltown, Ind.	.....	8.50–10.00	.....	10.00[8]	.....	.....	8.50[22]	1.35[16]
Ohio points	11.50	7.50	7.50	12.00	8.00	11.00[23]	7.50	1.50[16]
Scioto, Ohio	11.50	7.00	7.00	8.00	8.25	.62½	6.00	1.50
Sheboygan, Wis.	.....	10.50	.....	.....	.....	.....	9.50	2.00[4]
Wisconsin points[6]	.....	11.50	.....	.....	.....	.....	9.50	.....
Woodville, Ohio	11.50	7.50	7.50	12.50	8.00	10.00[9]	8.00	1.50[3]
SOUTHERN:								
El Paso, Texas	.....	.....	.....	.....	.....	.....	7.00	1.50
Frederick, Md.	.....	8.00–9.50	8.00–9.50	.....	.....	9.50[15]	7.00[15]	.....
Graystone & Landmark, Ala.	12.50	9.00	.....	12.50	.....	.....	7.50	1.35
Keystone, Ala.	19.00	9.00	9.00	9.00	.....	.....	7.50	1.35
Knoxville, Tenn.	19.00	9.00	9.00	9.00	.....	.....	7.50	1.35
Ocala, Fla.	14.00	11.00	10.00	14.00	.....	.....	.....	1.40[10]
WESTERN:								
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	.....
Los Angeles, Calif.	15.00	14.00	12.00	18.00	.....	.....	13.50	.....
San Francisco, Calif.	19.50	17.50	12.70	17.50–19.00	13.00[19]	.90[17]	13.00[18]	1.85[17]
Tehachapi, Calif.[18]	10.80	.....	6.75[11]	12.00	.....	.....	10.30	.....
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00	.....	18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel; in bbl. .95. [5] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9] 80-lb. [10] In bags. [11] Refuse or air slack, 10.00–12.00. [12] To 3.00. [13] Delivered in Southern California. [15] To 8.00. [16] to 1.70. [17] Less credit for return of empties. [18] 90-lb. sacks. [19] Also 14.50. [22] To 9.00. [23] Per bbl., 2.15. [30] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Utica and Ottawa, Ill.	1.00–3.25	.75
Warwick, Ohio	.....	2.00
Zanesville, Ohio	.....	2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Ground talc (20-50 mesh), bags 7.00– 8.50
- Ground talc (150-200 mesh), bags 7.25–15.00
- Pencils and steel crayons, gross, 5-in., .80–1.75; 4-in. .50– 1.25

Chester, Vt.:
- Ground talc (150-200 mesh), paper bags 7.50–8.50a
- Same, including 50-lb. bags 8.50– 9.50

Chicago and Joliet, Ill.:
- Ground (150-200 mesh), bags 30.00

Cromleys Mt., Md.:
- Crude talc 63.00

Dalton, Ga.:
- Crude talc (for grinding) 4.00
- Ground talc (150-200 mesh), bags 9.00
- Pencils and steel worker's crayons, per gross 1.00– 2.00

Emeryville, N. Y.:
- (Double air floated) including bags:
- 325–350 mesh 14.75–16.00

Hailesboro, N. Y.:
- Ground talc (300-350 mesh) in 200-lb. bags 15.50–20.00

Henry, Va.:
- Crude (mine run) 3.50– 4.50
- Ground talc (150-200 mesh), bags 7.50–14.50

Joliet, Ill.:
- Ground talc (200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00
- Crude talc 3.75

Keeler, Calif.:
- Ground (200-300 mesh), bags 20.00–30.00

Natural Bridge, N. Y.:
- Ground talc (300-325 mesh), bags 12.00–15.00

(a) Bags extra.

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

- Columbia, Tenn.—B.P.L. 65-70% 3.50– 4.50
- Gordonsburg, Tenn.—B.P.L. 68-72% 4.00– 4.50
- Mt. Pleasant, Tenn.—B.P.L., 77% 6.50
- Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72% 5.00
- B.P.L. 75% 6.00
- Twomey, Tenn.—B.P.L. 65%, 2000 lb. 8.00– 9.00

Ground Rock
(2000 lb.)

- Centerville, Tenn.—B.P.L. 65% 8.00
- Gordonsburg, Tenn.—B.P.L. 68% 3.50
- B.P.L. 72% 4.50
- Mt. Pleasant, Tenn.—Lime phosphate: B.P.L., 73%, 98% thru 100 mesh, 90% thru 200 mesh, 80% thru 300 mesh 11.20
- B.P.L. 72% 5.00–5.50
- Twomey, Tenn.—B.P.L. 65% 8.00
- Wales, Tenn.—B.P.L. 65% 11.00

Florida Phosphate

(Raw Land Pebble)
(Per Ton)

- Florida—F.o.b. mines, gross ton, 68/66% B.P.L., Basis 68% 3.25
- 70% min. B.P.L., Basis 70% 3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

New York City, N. Y.—Per lb.,
- Cut mica (1½x2) 1.60
- Cut mica (8x10) 26.00

Pringle, S. D.—Mine run, per ton 125.00
- Punch mica, per lb. .06
- Scrap, per ton, carloads 20.00

Rumney Depot, N. H.—Per ton,
- Mine run 300.00
- Clean shop scrap 25.00
- Mine scrap 22.50–24.00
- Roofing mica 37.50
- Punch mica, per lb. .12
- Cut mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, and American Botticchino, coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Brighton, Tenn.—Pink marble chips	$3.00	$3.00
Crown Point, N. Y.—Mica spar		b9.00–‖12.00
Davenport, Ia.—White limestone, in bags	6.00	6.00
Easton, Penn.—Royal green	16.00–18.00a	
Harrisonburg, Va. — Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio — Concrete facings and stucco dash		11.00–18.00
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt. — Middlebury white		†9.00–‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		5.50– 7.50
Phillipsburg, N. J.—Royal green granite		16.00–18.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Rose pink granite, bulk		12.00
Stockton, Calif.—"Nat-rock" roofing grits		12.00–20.00
Tuckahoe, N. Y.—Tuckahoe white	8.00	
Warren, N. H.		¶7.90–‖8.95
Wauwatosa, Wis.		20.00–32.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00
Whitestone, Ga.		*10.00

†C.L.; L.C.L. 16.00. ¶C.L. ‖L.C.L. (a) Including bags. (b) In 100-lb. bags, car lots, min. car 20 tons. * Per 100 lb.

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140-mesh	19.00
Buckingham, Ore. — White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y. — Color, white; analysis, K_2O, 9.63%; Na_2O, 1.01%; SiO_2, 69.72%; Fe_2O_3, .00%; Al_2O_3, 18.6% (crude); bags, per ton	9.00
East Hartford, Conn. — Color, white, 40 mesh to 200 mesh	15.00–28.00
East Liverpool, Ohio — Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; Arizona spar, crude, bags, 12.50–14.00; bulk	11.00–12.50
Pulverized, 95% thru 200 mesh; bags, 19.73–23.50; bulk	15.75–22.50
Pulverized, 20% thru 80 mesh; bags, 17.60; bulk	16.50
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk (Bags 15c extra.)	18.00
Crude feldspar, bulk	12.00
Tennessee Mills—Color, white; analysis, K_2O, 10%; Na_2O_3, 3%; SiO_2, 68%; 99½% thru 200 mesh; bulk (Bags, 15c extra)	18.00
Toronto, Can.—Colo, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50– 8.00

Chicken Grits

Afton, Mich.—(Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Chico and Bridgeport, Tex.	20.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass.—(Limestone)	‡7.50–*9.00
Davenport, Ia.—(Limestone), bags, per ton	6.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—Per ton, including sacks:	
Feldspar	14.00
Gypsum	7.50– 9.50
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton (a)	10.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, per ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	7.00
Wisconsin Points—(Limestone), per ton	15.00
Winona, Minn.—(Limestone), sacked, per ton, 8.00; bulk, per ton	6.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags. (a) F.o.b. Middlebury, Vt.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	11.00
Anaheim, Calif.	10.50–11.00
Barton, Wis.	10.50g
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50–13.50
Detroit, Mich. (h)	j13.00–16.00*d
Farmington, Conn.	13.00
Flint, Mich.	18.00†
Grand Rapids, Mich.	12.50
Hartford, Conn.	14.00–19.00*
Jackson, Mich.	13.00
Lakeland, Fla.	10.00–11.00
Lake Helen, Fla.	9.00–12.00
Lancaster, N. Y.	12.50
Madison, Wis.	12.50a
Mishawaka, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50–15.00*
Pontiac, Mich.	11.50
Portage, Wis.	15.00
Prairie du Chien, Wis.	18.00–22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.00–14.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
South St. Paul, Minn.	9.00
Syracuse, N. Y.	13.00–14.00
Toronto, Canada (f)	15.00†e
Wilkinson, Fla.	12.00–16.00
Winnipeg, Canada	15.00

*Delivered on job. †5% disc. 10 days. ‖Dealers' price. (a) Less 50c disc. per M, 10th of month. (d) 5% disc., 10th of month. (e) Delivered. (f) F.o.b. yard, 12.50. (g) Delivered Milwaukee, 13.00. (h) Also 15.50. (j) Also 14.00.

Portland Cement

	Per Bag	Per Bbl.	High Early Strength
Atlanta, Ga.		2.36	3.51¶
Baltimore, Md.		2.26–2.65	3.55¶
Birmingham, Ala.		2.00	3.44¶
Boston, Mass. (g)	.68¼	2.23–2.73e	3.27¶
Buffalo, N. Y. (h)	.62½	2.00–2.50	3.40¶
Butte, Mont.	.90¼	3.61	
Cedar Rapids, Iowa		2.24	
Charleston, S. C.		2.25–2.65d	3.58¶
Cheyenne, Wyo.	.64	2.56	
Chicago, Ill.		2.05–2.45	3.35¶
Cincinnati, Ohio		2.22–2.62	3.52¶
Cleveland, Ohio		2.24–2.64	3.54¶
Columbus, Ohio		2.22–2.62	3.52¶
Dallas, Texas		1.80	3.39¶
Davenport, Iowa		2.24	
Dayton, Ohio		2.22–2.64	3.54¶
Denver, Colo.	.63¾	2.55	
Des Moines, Iowa		2.14	
Detroit, Mich.		1.95–2.35	3.25¶
Duluth, Minn.		2.04	
Houston, Texas		1.90	3.63¶
Indianapolis, Ind.	.54¾	2.09–2.49	3.39¶
Jackson, Miss.		2.04–2.44	3.54¶
Jacksonville, Fla.		2.60b	3.79¶
Jersey City, N. J.		2.13–2.53	3.43¶
Kansas City, Mo.	.45½	1.82	3.22¶
Los Angeles, Calif.	.62½	2.50	
Louisville, Ky.	.55½	2.57	3.47¶
Memphis, Tenn.		2.04–2.44	3.34¶
Milwaukee, Wis.		2.20–2.60	3.50¶
Minneapolis, Minn.		2.12–2.22	
Montreal, Que.		1.60	
New Orleans, La.	.45½	1.82	3.61¶
New York, N. Y.	.60¾	1.93–2.43	3.33¶
Norfolk, Va.		1.97	3.27¶
Oklahoma City, Okla.	.57¼	2.29	3.69¶
Omaha, Neb.	.54	2.16	3.56¶
Peoria, Ill.		2.22	
Philadelphia, Penn.		2.11–2.21	3.51¶
Phoenix, Ariz.		3.91*	
Pittsburgh, Penn.		2.05–2.44	3.34¶
Portland, Ore.‡		2.40–2.90a	
Reno, Nev.‡		3.41a	
Richmond, Va.		2.32–2.72	3.62¶
Salt Lake City, Utah	.70¼	2.81	
San Francisco, Calif.‡		2.71a	
Savannah, Ga.		2.60c	3.65¶
St. Louis, Mo.	.48¾	1.95–2.35	f3.25¶
St. Paul, Minn.		2.12–2.22	
Seattle, Wash.		2.50–2.70†	f3.50†
Tampa, Fla.		2.40	4.11¶
Toledo, Ohio		2.20–2.60	3.50¶
Topeka, Kans.	.50¼	2.01	3.41¶
Tulsa, Okla.	.53¼	2.13	3.53¶
Wheeling, W. Va.		2.12–2.52	
Winston-Salem, N. C.		2.29–2.69	3.59¶
Mill prices f.o.b. in carload lots, without bags, to contractors.			
Albany, N. Y.	.43¾	1.75	
Bellingham, Wash.		2.10	
Buffington, Ind.		1.80	
Chattanooga, Tenn.		2.45*	
Concrete, Wash.		2.35	
Davenport, Calif.		2.05	
Hannibal, Mo.		1.90	
Hudson, N. Y.		1.75	
Leeds, Ala.		1.65	
Lime and Oswego, Ore.		2.50‡	
Mildred, Kan.		2.35	
Nazareth, Penn.		2.15	
Northampton, Penn.		1.75	
Richard City, Tenn.		2.05	
Steelton, Minn.		1.85	
Toledo, Ohio		2.20	
Universal, Penn.		1.80	

NOTE—Add 40c per bbl. for bags. *Includes sacks. †10c disc., 10 days. ‡10c disc., 15 days. (a) Includes cloth sacks returnable at 10c each. (b) 24c bbl. refund for paid freight bill. (c) 35c bbl. refund for paid freight bill. (d) 40c bbl. refund for paid freight bill. (e) 45c bbl. foreign refund. (f) "Velo" cement, including cost of paper bag. ¶ "Incor" Perfected prices per bbl. packed in paper sacks. (g) Also 2.33 per bbl. (h) Also 2.10 per bbl.

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.70	4.00	4.00	4.00	4.00	4.50	.....	.....	.....	.....	.....	15.00	20.00
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	.....	.....	.....	.....	11.70u	.....	.....	.....
Blue Rapids, Kan.	1.70	4.00	.....	.....	.....	.....	10.00	.....	.....	.....	.....	15.00	20.00
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	.....	.....	13.50	.....	.....	.....
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	.....	.....	.....	.....	14.30o	12.30m	.....	m9.00–11.00o	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	4.50–5.00	13.10–14.00	5.00	.....	7.25	.....	.....	.....	.....	25.00
Douglas, Ariz.	.....	.....	6.00	14.50	15.00	.....	18.00	.....	30.00	.....	.....	.....	.....
Fort Dodge, Iowa	1.70	4.00	6.00	9.00	9.00	9.50	.....	.....	.....	19.00	.....	15.00	20.00
Grand Rapids, Mich.	2.65	4.00	6.00	6.00	9.00	9.00	17.65	.....	22.75	19.00	12.00	15.00	18.00
Gypsum, Ohio	1.70–3.00	4.00	6.00	7.00–9.00	9.00	9.00	19.00	7.00	24.50	19.00	.....	15.00	20.00–25.00
Los Angeles, Calif. (f)	.....	7.50–9.50	7.50–9.50	8.50–10.00	9.00–11.00	.....	9.00–11.00	.....	29.00–34.00	.....	.....	.....	.....
Medicine Lodge, Kan.	1.70	4.00	.....	.....	.....	.....	.....	.....	15.00	.....	.....	15.00	20.00
Oakfield, N. Y.	2.50	.....	.....	5.50	6.00	6.00	.....	5.50	.....	.....	.....	15.00	25.00
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	9.00	13.40	14.40	.....	15.40	.....	.....	.....	.....	.....	.....
Seattle, Wash.	6.00	10.00m	10.00m	13.00m	14.00m	.....	14.00	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00d	25.00e	33.00

NOTE—Returnable bags. 10c each; paper bags, 1.00 per ton extra (not returnable. (a) Hardwall plaster, 13.00; casting, finishing molding, 14.00; (b) Calacoustic plaster, 10.00 at mill; (c) Plaster lath; (d) ¼x48x36 in.; (e) ⅜x48x36 in.; (f) plasterboard 18c to 20c per yd.; (m) includes paper bags; (o) includes jute sacks; (u) includes sacks; (v) retail 35.00.

Market Prices of Cement Products and Slate

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12–55.00¶	
Chicago District‖	180.00–210.00a	230.00–260.00a	280.00–330.00a
Columbus, Ohio	13.00	.....	.....
Detroit, Mich.	.15– .17†	.....	.24–.26†
Forest Park, Ill.	21.00*	.....	.....
Grand Rapids, Mich.	11.00*	.....	.....
Graettinger, Iowa	.18– .20	.....	.....
Indianapolis, Ind.	.10– .12a	.....	.....
Los Angeles, Calif.	4x8x12–5.00*	.....	.....
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.18– .20	.....	.....
Tiskilwa, Ill.	.16– .18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00– 40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00– 50.00
Camden & Trenton, N. J.	17.00	.....
Chicago District "Haydite"	14.00	.....
Columbus, Ohio	16.00	17.00
El Paso, Tex.—Klinker	10.00	.....
Ensley, Ala. ("Slagtex")	12.50	.....
Eugene, Ore.	25.00	35.00– 75.00
Forest Park, Ill.	.....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50– 65.00
Los Angeles, Calif.	12.50	.....
Milwaukee, Wis.	14.00	30.00
Mt. Pleasant, N. Y.	.....	14.00– 23.00
Omaha, Neb.	18.00	30.00– 40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	15.50	.....
Portland, Ore.	17.50	23.00– 55.00
Mantel brick—100.00–150.00		
Prairie du Chien, Wis.	14.00	22.00– 25.00
Rapid City, S. D.	18.00	30.00– 40.00
Waco, Texas	16.50	32.50–125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

*40% off List.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.:	
Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60
Pasadena, Calif. (Stone Tile):	
3½x4x12, per 100	3.00
3½x6x12, per 100	4.00
3½x8x12, per 100	5.50
Tiskilwa, Ill.;	
8x8, per 100	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	
3½x6x12, per M	50.00
3½x8x12, per M	60.00
Prairie du Chien, Wis.:	
5x8x12, per M	82.00
5x4x12, per M	46.00
5x8x6 (half-tile), per M	41.00
5x8x10 (fractional), per M	82.00
Yakima, Wash. (Building Tile):	Each
5x8x12	.10

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened 200 mesh, $7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton. Granville, N. Y.—Red, green and black, $7.50 per ton.
Pen Argyl, Penn.—Blue-black, bulk, $6.00 per ton; $6.50 in burlap bags, plus 10c per bag.

Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—Oxford gray Buckingham	14.62	18.13	23.40	26.33	32.14	40.95
Bangor, Penn.—No. 1 clear	9.50–13.00	22.00	26.00	30.00	40.00	50.00
No. 1 ribbon	8.00– 9.25	18.00	22.00	26.00	36.00	46.00
Gen. mediums	8.50– 9.50	.....	.....	.....	.....	.....
No. 2 ribbon	6.00– 6.50	.....	.....	.....	.....	.....
Chapman Quarries, Penn.—No. 1	8.50–11.25	.....	.....	.....	.....	.....
Medium	7.75– 9.00	.....	.....	.....	.....	.....
Artistique	.....	16.00	23.00	26.00	32.00	40.00
Fairhaven, Vt.—						
Mottled purple and unfading green	21.00	24.00	30.00	36.00	48.00	60.00
Granville, N. Y.—Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green and gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple and unfading green	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Monson, Maine	19.80	24.00	.....	.....	.....	.....
Pen Argyl, Penn. (Albion Bangor)						
No. 1 Clear	7.25–10.50	16.00	23.00	27.00	37.00	46.00
Albion Bangor Mediums	8.00– 9.00	.....	.....	.....	.....	.....
Cathedral gray	10.50–12.50	18.00	25.00	29.00	39.00	48.00
No. 1 ribbon	8.00–8.50	18.00	22.00	26.00	36.00	46.00
Textural	15.00	24.00	30.00	36.00	48.00	60.00
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1 clear	9.50	18.00	22.00	26.00	36.00	46.00
Blue Mountain No. 2 clear	8.00	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.

Cement Building Tile

Cement City, Mich.:	
5x8x12, per 100	5.00
Chicago District (Haydite):	
4x 8x16, per 100	14.00
8x 8x16, per 100	22.00
8x12x16, per 100	30.00
Columbus, Ohio:	
5x8x12, per 100	6.50
Detroit, Mich.:	
5½x8x12, per M	75.00
Grand Rapids, Mich.:	
5x8x12, per 100	6.00
Longview, Wash.:	
4x6x12, per 100	5.00
4x8x12, per 100	6.25
Mt. Pleasant, N. Y.:	
5x8x12, per M	78.00
Houston, Texas:	
5x8x12 (Lightweight), per M	80.00

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.	2.00
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per 100 ft.	
3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	10.00
Waukesha, Wis.—Drain tile, per ton	8.00

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise no d

Culvert and Sewer	4 in.	6 in.	8-in.	10 in.	12 in.	15-in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Detroit, Mich. (c)																	
Sewer	.10	.12	.22	.30	.40	.60	.90	1.20	.....	1.75	2.00	2.50	3.30	4.50	5.75	6.50	8.00
Culvert	.....	.....	.....	.....	.95	1.25	1.60	.....	.....	2.25	2.50	3.00	3.50	5.00	6.50	8.00	10.00
Grand Rapids, Mich. (b)	.....	.....	.....	.60	.70	.90	1.20	.....	.....	1.80	2.10	2.35	3.50	4.00	5.60	6.90	7.85
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Longview, Wash.							Sewer pipe 40% off list; culvert—list										
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.							6 in. to 24 in., 18.00 per ton										
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.							12.00 per ton										
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	.70	1.55	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tacoma, Wash.	.15	.17	.22	.30	.40	.55	.70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	.90	.....	1.20	.....	.....	1.91	.....	2.60	3.60	4.35	5.93	6.8	7.70
Yakima, Wash.	.....	.....	.....	.....	.....	.....	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78

(a) 24-in. lengths. (b) Reinforced (c) Delivered on job; 5% discount, 10th of month. †21-in. diameter. ‡Price per 2-ft. length.

New Machinery and Equipment

New Belt Feeder

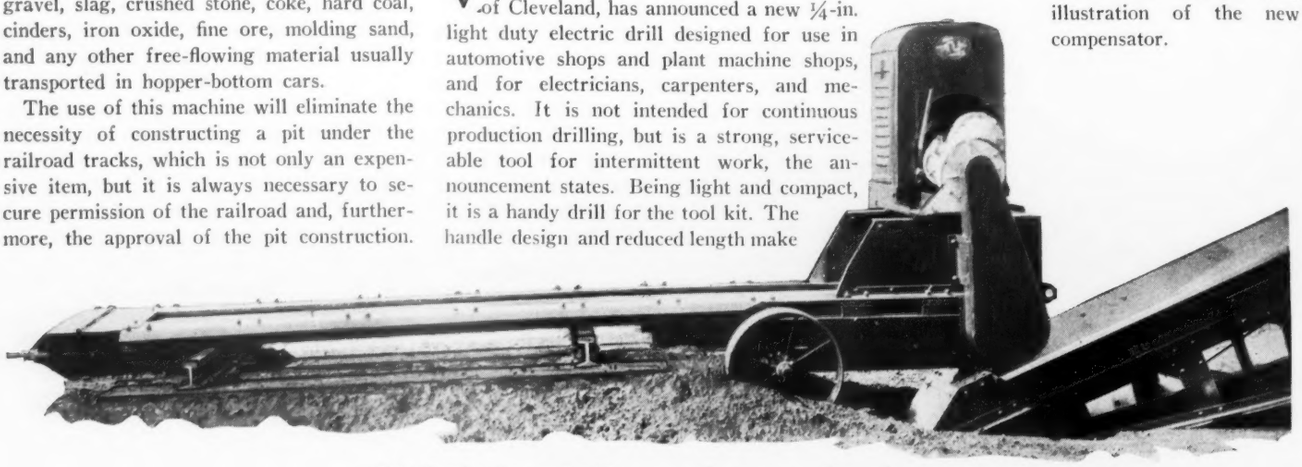
FOR UNLOADING CARS of all bulk material, the Barber-Greene Co., Aurora, Ill., announces the new B-G belt feeder. The purpose of the feeder is to facilitate the unloading of material such as sand, gravel, slag, crushed stone, coke, hard coal, cinders, iron oxide, fine ore, molding sand, and any other free-flowing material usually transported in hopper-bottom cars.

The use of this machine will eliminate the necessity of constructing a pit under the railroad tracks, which is not only an expensive item, but it is always necessary to secure permission of the railroad and, furthermore, the approval of the pit construction. A small pit on the outside of the railroad track for the conveyor hopper to sit under the discharge end of the gravel feeder is all that is needed.

The use of a B-G feeder, it is claimed, will speed up the unloading of material from hopper-bottom cars; will control the flow of the material within the capacity of the conveyor; will protect the conveyor, and especially the belt, from overloading and damage, thus increasing the life of such equipment; make it possible to unload the entire car of free-flowing material without shoveling.

The machine may be used either over the rail or under the rail, as required. The maximum thickness through the feeder frame, including the top sliding plate, is $4\frac{7}{16}$ in.

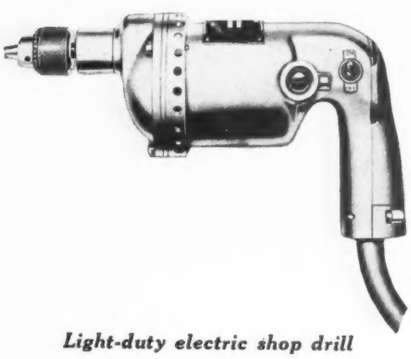
Either an electric motor or gasoline engine can be used to drive the feeder. The machine gasoline driven weighs 1690 lb. and electrically driven 1520 lb.



Belt feeder for unloading cars of stone, sand, coal, etc.

New Light Duty Shop Drill

VAN DORN ELECTRIC TOOL CO., of Cleveland, has announced a new ¼-in. light duty electric drill designed for use in automotive shops and plant machine shops, and for electricians, carpenters, and mechanics. It is not intended for continuous production drilling, but is a strong, serviceable tool for intermittent work, the announcement states. Being light and compact, it is a handy drill for the tool kit. The handle design and reduced length make it especially useful in close corners, it is claimed. The new drill is equipped with a universal motor, operating on either direct or alternating current, hardened alloy steel gears, chuck, cable and attachment plug.

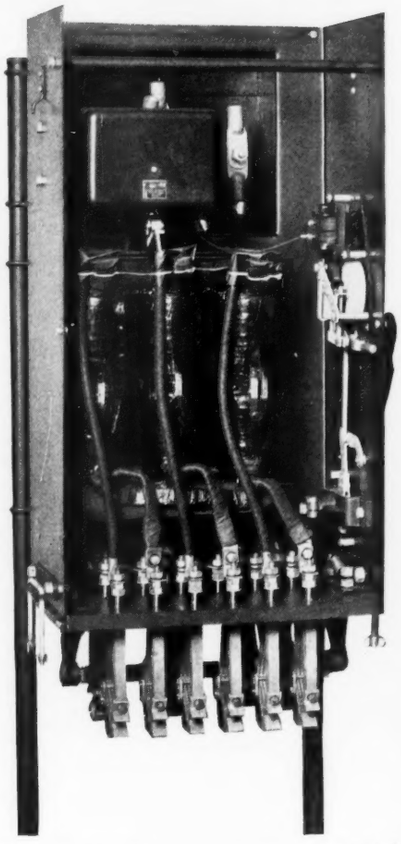


Light-duty electric shop drill

New Compensator Having a High Interrupting Capacity

A NEW manual starting compensator having a high interrupting capacity has been announced by the General Electric Co., Schenectady, N. Y. It is especially applicable to the control of high-speed, squirrel-cage motors, the company states, including all two-pole and most four-pole motors, particularly those driving loads of relatively high inertia and therefore making high inrush currents and requiring considerable time to get up to speed. For such applications the high capacity of the contact mechanism of this compensator should be of special value. The new compensator is designated as type CR-1034-K-33.

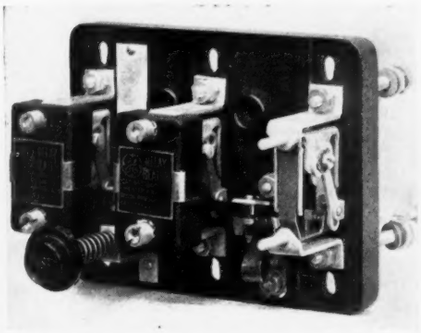
Among the advantageous features claimed for the new compensator by the manufacturer are the following: (1) A switch design providing wide break and high interrupting capacity. (2) Time-delay under-voltage release, preventing shutdown on brief power disturbances and assuring that, in case of short circuit, the line protective devices will open first. (3) Contact tips of standard contactor construction and action, reducing maintenance cost to a minimum. (4) Cabinet construction of case for wall mounting, with ample room for ready connections and access to all parts. These features are illustrated in the accompanying illustration of the new compensator.



Manual starting compensator with high interrupting capacity

New Relays with Renewable Heaters

A COMPLETE new line of double- and triple-pole temperature overload relays is offered by the General Electric Co., Schenectady, N. Y. The principal advantages claimed for the new line are in the construction, which allows the user to remove and insert new heating elements when necessary, and which allows the use of a third relay unit on the same



Double- and triple-pole temperature overload relays

base when it is desired to protect three legs of a circuit. The new line is divided into two parts, bearing the designations TC-121 and TC-131. The TC-121 relays are designed for the protection of two legs of a circuit, while the TC-131 provides an element for the protection of a third leg. Both forms are rated in current-carrying capacity from 30 to 150 amperes, and are available for either front or back connecting. The back-connected forms are for panel mounting, but use the same base as on the front-connected forms. On enclosed panels, air drafts are eliminated by the enclosing case, but on open panels it is necessary to use a cover over the relay.

An electric reset is provided as an accessory When used with a relay which is mounted at the bottom of a base, a sub-base is added. The sub-base is clamped to the main base by the relay itself. Where there is sufficient space, the reset relay can be mounted on the panel itself.

New 1-Yd. Gas Shovel

THE LORAIN-55 is a new 1-yd. center-drive crane, crane, clamshell, dragline and shovel made by the Thew Shovel Co., Lorain, Ohio. It is closely patterned after the design of the 1¼-yd. Lorain-75. It has, however, been developed, designed and built as an entirely new superstructure of a size, weight and strength throughout to expressly handle a 1-cu. yd., struck-measure dipper. The Lorain-55, in its superstructure turntable drive, its crawler truck and its shovel boom, is Thew center drive.

In its applications the new Lorain-55 has been developed as a 1-yd. capacity crane, dragline and shovel and particular attention has been paid to incorporating in its features that will improve its operation as any of these units, according to the manufacturers. For the crane, clamshell and dragline units new style booms have been developed in 35-, 40- and 45-ft. lengths or longer if desired.

The 35-ft. boom is a steel single piece, straight channel type, strongly tied together by ample cross-bracing. The 40- and 45-ft. booms are box-section, latticed-steel booms in two sections, with interchangeable boom heads.

The shovel boom is 18 ft. long, of plate girder construction. Dipper sticks 14-, 16- and 18-ft. or longer are available, all of these being one-piece rectangular welded steel sections. All dipper sticks are equipped with interchangeable rock sections and with a patented dipper stick end rack.

The boom hoist is by means of a power driven self-locking worm drive.

The shovel has a tail swing of only 9 ft. This reduced tail swing is largely due to the use of the Thew center drive on the turntable. This drive consists of only a power take off, silent chain drive and a central driving pinion which actuates three power shafts. Any one of the three power shafts can be separately engaged and independently controlled with the full power of the engine applied to it. Also, all three power shafts can be simultaneously engaged, enabling three operations at once with independent control over each.

The power plant is a Waukesha "JL" gasoline motor 6-in. bore by 7-in. stroke, with Ricardo head, automatic governor, air cleaner and a 50-gal. fuel tank are standard equipment. A 40-hp. electric motor can be used in place of the gas motor when desired. Electric motor control is by means of an automatic push button.

Johns-Manville Buys Banner Rock Products Co.

ANNOUNCEMENT has been made by the Johns-Manville Corp. of the purchase for cash of the Banner Rock Products Co., of Alexandria, Ind., largest producers in this country of rock wool, a fireproof insulating material, and owners of extensive deposits of the special type of silica rock from which this material is manufactured.

"The purchase of the Banner Rock Products Co.," Theodore F. Merseles, president of the Johns-Manville Corp., says, "is a logical step in the program for the continued development of insulating materials of all kinds now so extensively demanded for industrial and building insulation."

Rock Products Has Two Distinguished Visitors

AMONG the visitors to ROCK PRODUCTS' editor's sanctorum the past few weeks were Robert Claye, director of technique, des Usines de la Société des Ciments Portland, Beaumont-sur-Oise, France; and Hans Engel, director, des Pommerschen Industrie-Vereins A. A., Stettin, Germany. Both gentlemen are visiting American portland cement plants, and are particularly interested in slurry filter installations, the pumping of cement raw materials and finished cement.

Recent addition to convertible crane, shovel, dragline equipment

Atlantic City exhibit showing one of the John T. Dyer company's quarries

Atlantic City Exhibit Depicts John T. Dyer Quarry Company

THE exhibit of the trap rock quarries of the John T. Dyer Co., Norristown, Penn., was one of the most interesting presented at the Board Walk display room of the Du Pont company at Atlantic City, N. J., as can be seen by the cut, which shows in the background a picture of one of their trap rock quarries before and after a shot. In the foreground are attractively arranged miscellaneous equipment incidental to quarry blasting.

Northwestern States Cement Company Changes

THE NORTHWESTERN STATES PORTLAND CEMENT CO., Mason City, Iowa, reports that business volume for 1928 was the largest in the company's history.

The Northwestern plant has a capacity of 8,000 bbl. of cement daily. It has shipping facilities on seven lines of railroad, and sixteen salesmen represent the company in a wide sales territory.

Col. Hanford MacNider was elected chairman of the board at the annual meeting Monday, December 24. R. E. Boyle was named assistant president, and was given added responsibilities in the management of the plant. W. H. L. McCourtie of Dallas, Texas, who was elected president and general manager, will not spend much time in Mason City. Mr. Boyle has been with the company since its organization in 1906.

The late C. H. McNider, widely known Iowa banker and business man, who was president and general manager of the company from 1910 up to the time of his death, is credited with building the institution to its present size and efficiency. W. H. L. McCourtie was the organizer of the company. In addition to heading the Mason City company, he also is president of the Trinity Portland Cement Co. with plants at Dallas, Houston and Fort Worth, Texas.—*Des Moines* (Ia.) *Register.*

American Cyanamid Acquires Structural Gypsum Co.

THE American Cyanamid Co., the important Duke power and industrial property that has been prominently mentioned in connection with the development of Muscle Shoals, has acquired a 67% stock ownership in the Structural Gypsum Corp., which now becomes one of Cyanamid's string of subsidiaries.

Structural Gypsum, it is understood, utilizes the black sludge which is a by-product of the Cyanamid company's New Jersey plant. Formerly Cyanamid dumped this sludge on the Jersey meadows and into the sea until the government secured a ruling against this practice. Then Cyanamid paid $1 a ton to have the sludge hauled away.

An examination of the sludge disclosed that it contained gypsum in almost pure form, mixed with graphite. Following this discovery the company began buying into the Structural Gypsum Co., which has recently erected a $1,000,000 plant at Linden, N. J. Cyanamid pumps the gypsum-graphite sludge to the plant through a 9-in. pipe line at the rate of 1500 tons a day.

It is understood that Structural Gypsum pays Cyanamid about 40c. a ton for the material and by a patented process makes it into gypsum floor and roof building blocks. The finished product is shipped by truck to New York, Trenton and Philadelphia. Gypsum cannot be mined at less than $3.50 a ton, it is claimed.

Because of its expansion American Cyanamid has had a sharp rise on the New York Curb Market in recent months, and numerous rumors have been circulated concerning the activities of the company, which has the following main subsidiaries: The American Cyanamid Sales Co., the Owl Fumigating Corp., Fumigadores Quimacos, S. A. Air Nitrates Corp., and Amalgamated Phosphate Co.

Stockholders in the Cyanamid company were recently offered rights to purchase one new class B share for each two shares of class A or B held. The new offerings will yield about $5,000,000, which will be used to finance the new Florida purchases and to provide for a large scale expansion of the concern's plants at Warners, N. J., and Niagara Falls, N. Y.

Clinchfield Cement Plant Closed

THE CLINCHFIELD cement plant in Kingsport, Tenn., was reported closed February 1 and will remain closed indefinitely. The plant, one of eight cement manufacturing units of the Pennsylvania-Dixie Cement Corp., was constructed 17 years ago and has never been idle—it was formerly the Clinchfield Portland Cement Co.

Shortage of orders is understood to be responsible for the shutdown although the other units of the Penn.-Dixie corporation, one of which is located near Chattanooga and another in Georgia, are not affected. The remainder of the corporation plants are located in Pennsylvania and New York.—*Wall Street News* (New York City).

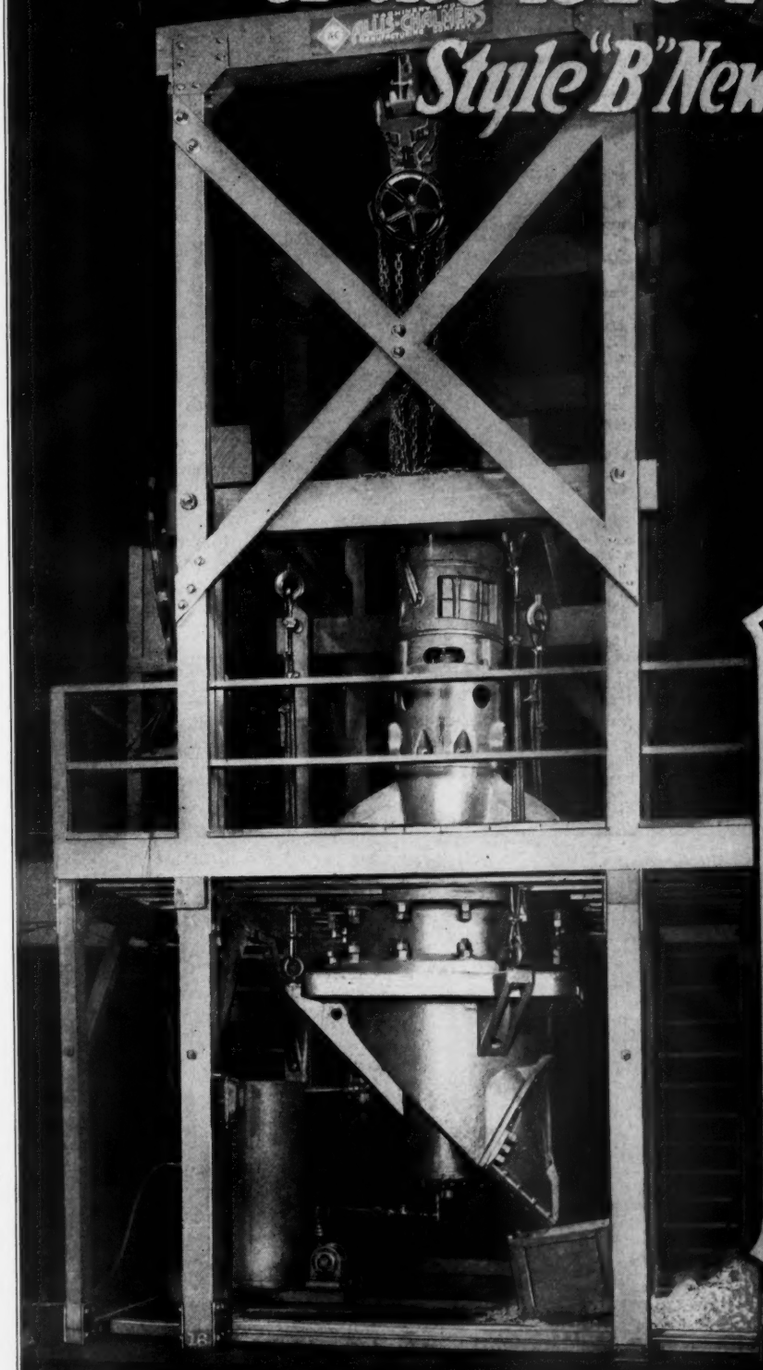
Marquette Cement Places Order for Four Self-Unloadng Barges

THE Marquette Cement Manufacturing Co. of Chicago, operating plants at LaSalle, Ill., and Cape Girardeau, Mo., recently awarded a contract to the Riter Conley Co., Pittsburgh, for four self-unloading bulk cement barges from designs prepared by T. R. Tarn, naval architect of Pittsburgh. These barges will be each 175 x 35 x 8 ft. and will have a carrying capacity of 800 tons, in three hoppers, each of them being 144 ft. in length.

The barges will contain approximately 1200 tons of steel material and will be built at a cost of about $120,000. They are expected to be completed within three months and will be placed in operation on the Mississippi river between Cape Girardeau and Memphis, where loading and unloading docks are now being constructed. Further plans of this concern provide for building a 700-hp. twin screw Diesel tug.—*Pittsburgh* (Penn.) *Post-Gazette.*

An Outstanding Feature of the 1929 Road Show

Style "B" Newhouse Crusher



VISITORS to the 1929 Road Show at Cleveland were impressed by the 10″ Style "B" Newhouse Crusher on exhibit there. Some liked the rapid crushing action of this crusher, others remarked on the uniformity of product. The method of supporting the crusher from the framework of a building, eliminating expensive foundations, was attractive and also the fact that much of the vibration and shock of crushing was absorbed by the cables. It was hard to realize that a crusher could be so simple; there were no gears, pinions, pulleys, or belts, to cause trouble or wear out. The few working parts are lubricated through a positive oiling system that includes a filter to insure clean oil at all times.

Bulletin 1469 tells more about this crusher. Just write for it.

ALLIS-CHALMERS

MILWAUKEE. WIS. U.S.A.

News of All the Industry

Incorporations

Superior Cast Stone Co., Grand Rapids, Mich., capital increased from $10,000 to $25,000.

Ready-Mixed Concrete Co. of New Jersey, Asbury Park, N. J., 900 shares common.

American Structural Concrete Co., Inc., Newark, N. J., 2500 shares common. Building materials.

Meriwether Sand and Gravel Co. of Louisiana. Ned A. Stewart, Lewisville, Ark.

Pinehill Lime and Stone Co., Wilmington, De., $50,000.

Transit Mixed Concrete Co., Jersey City, N. J., $150,000.

Missouri-Kansas Gravel Co., Pittsburgh, Kans., $75,000 preferred, 4000 shares common no par.

Brookville Gravel Co., Brookville, Ohio, 250 shares no par. Sam D. Kelly, Robert C. Knee, R. P. Somers.

Construction Materials Corp., Wilmington, Del., 375,000 shares common. Gravel, stone and rock.

Northwestern States Portland Cement Co., Mason City, Iowa, capital stock increased from 52,500 shares $100 par to 210,000 shares $25 par.

Hugenot Sand and Gravel Co., Inc., Hugenot Park, S. I., N. Y., $7430. Erich Ort, August Horn and Christian Hyrup.

Maffei Sand and Gravel Corp., Nattick, Mass., $50,000; 500 shares $100. James Maffei, Angelia Maffei and Zillarini R. Luigi.

Vickery Gravel Co., Muskogee, Okla., $50,000. A. F. House, Tulsa; J. T. Lantrey and E. F. Vickery, Muskogee.

Metropolitan Concrete Co., Cleveland, Ohio, 10,000 shares no par. I. W. Stillinger, I. R. Faist and S. D. Laitinen.

Ryan Quarries, Inc., Albion, N. Y., 210 shares no par. James Hillary Ryan, William E. Ryan and Mary C. Ryan.

Texas Rock Asphalt Co., San Antonio, Texas, to transact business in Arkansas. M. E. Sherland, Little Rock, Ark., agent.

Gar-Rock Asphalt Co., Louisville, Ky., $220,000. Edward B. Nearm, M. C. Eiseman, Chicago; Claude B. Talbott, Detroit; Nelson Helm and T. K. Helm, Louisville.

East Tennessee Limestone Quarries, Johnson City, Tenn., $20,000. Reba Offinger, C. M. Rising, Luther Whitson, Elmer Taylor and Earle C. Offinger.

Consolidated Rock Porducts Co., Dover, Del., 1,000,000 shares common. Rock, cement, stone and gravel. E. E. Craig, A. L. Raughley, M. S. Cook, Dover.

Liberty Hill Quarry, Inc., Liberty Hill, N. C., $50,000. Mine, quarry and prepare for market rock, stone and other minerals. G. W. Crouse, J. B. Rose, Margaret E. Ross and others of Greensboro, N. C.

Shera Sand and Gravel Co., Richmond, Ind., $12,500. Mine, recover, provision, market and sell sand, gravel, stone and earth. Eddy K. Shera, Harry B. White, William E. Wilson, Charles S. Kidder and John J. Haramy.

California Rock Asphalt Corp., San Francisco, Calif., $1,500,000; 104,000 shares common, 16,000 shares class "A" preferred and 30,000 shares class "B" preferred, all of $10 parity. To own and operate asphalt and bituminized sand deposits. E. H. Higgins.

Buffalo Stone Co., Mondovi, Wis., 1000 shares common no par, 150 shares preferred $100. Acquire, quarry, mine, manufacture, sell and deal in all kinds of building and paving stones and materials. Pierre O. Southworth, Winifred Southworth, R. M. Rieser.

Cement

Alpha Portland Cement Co., Easton, Penn., has purchased a 3-yd. bucket crane with an 80-ft. span from the Whiting Corp. for its Ironton, Ohio, plant.

Atlas Portland Cement Co., New York, N. Y., has purchased a 2½-yd. bucket crane, a 10-ton overhead electric crane, a 15-ton overhead electric crane and a 20-ton crane for its Waco, Tex., mill, from the Cleveland Crane and Engineering Co.

Atlas Portland Cement Co., Northampton, Penn., has opened its Mill No. 2 at Northampton, which has been closed down since last August. Three hundred men are employed at this mill, and it is stated that former employes will be given the first chance at the jobs.

Canada Cement Co., Ltd., Montreal, Canada, has announced plans for the construction of a new storage warehouse in Halifax, Nova Scotia, to serve the surrounding territory. The Canada Cement Co., Ltd., is now constructing a warehouse at St. John, N. B., to serve New Brunswick, and another at Quebec.

Lone Star Cement Co. of New York, Hudson, N. Y., has had its plant shut down for some time while dust collectors are being installed on a number of the units and some overhauling is being done on the machinery. The company expects to have a mill that will be practically dustless when operation is resumed.

Signal Mountain Portland Cement Co., Chattanooga, Tenn., held its annual meeting on January 24 and re-elected all of its former officers for the coming year. John L. Senior, president of the company, denied the rumors that a proposition for the sale or merger of the company was discussed. He announced that the plant, which is now closed down, will reopen by the first of March.

Idaho Portland Cement Co., Pocatello, Idaho, is rapidly going ahead with the construction of its new plant at Inkom, which is scheduled to be ready for operation some time in June. Already the concrete foundations for the kilns, crushers and tanks are completed and workman have been busy unloading the first kiln unit. The large smokestack has been completed and the railroad from the quarry to the crusher has been finished, 2000 ft. of track having been laid.

Monarch Cement Co., Humboldt, Kan., has shown creditable civic interest in its home town through the gift of sufficient cement to pave a much-needed street in Humboldt. The city wished to pave several blocks of Bridge street, but did not have the money, so the Monarch company offered the cement free if the city would furnish the other materials and complete the job. It is estimated that the gift has saved the city about $1000 per block.

Sand and Gravel

Goodwin-Gallagher Sand and Gravel Corp., New York, N. Y., has ordered six new steel hopper cars from the Magor Car Corp.

Lenawee Sand and Gravel Co., Tecumseh, Mich., elected the following officers at its annual meeting recently: S. J. Wilson, president; Fred Blouch, vice-president; and Ira Ashley, secretary-treasurer.

Lewis County Gravel Co., Centralia, Wash., was visited recently by sneak thieves with a misplaced sense of humor. The prowlers took a few minor articles and then emptied about 400 yd. of material from the bins. This is the seventh time during the year that this plant has been so visited.

Lutesville Sand and Gravel Co., Cape Girardeau, Mo., has taken a ten-year lease on gravel deposits on the farm owned by F. D. Pillman at Arlington, Mo. The company is now engaged in building a spur track from the main line of the Frisco R. R. to the pits at the Gasconade river.

Stewart Sand and Material Co., Kansas City, Mo., has recently purchased a piece of property containing 20,000 sq. ft. in North Kansas City on which the company will establish another unit in its chain of building material yards. This new yard will serve the rapidly growing district around North Kansas City.

Seaboard Sand and Gravel Corp., New York, N. Y., sustained the loss of one of its barges when fire destroyed Barge 51 while it was tied up at the foot of Clay street in Brooklyn. New York papers state that after the blaze was extinguished firemen found the body of an unidentified man burned to death on the wreck.

Leonard Gravel Co., Lansing, Mich., held its annual meeting and chose the following officers: M. R. Carrier, president; F. P. Leonard, vice-president and general manager, and M. E. Sheltraw, secretary-treasurer. The Leonard company owns several hundred acres of gravel south of the city. It was organized in 1927, but completed its first full year in 1928.

Quarries

Cheetowaga Crushed Stone Corp., Cheetawaga, N. Y., has changed its name to the Federal Crushed Stone Corp.

Standard Lime and Stone Co., Baltimore, Md., is reported to be planning an expansion program for its works at Havre de Grace, Md., including new buildings and equipment to cost about $100,000.

Douds Stone Co., Douds, Iowa, which was incorporated recently for $50,000, is reported to be contemplating extensive improvements at its quarry east of Douds, including the installation of a second and larger crusher, together with longer elevators and better screening equipment. The plant, which is now operated by oil engine power, will shortly be entirely electrified. When the improvements are complete the plant will have a capacity of eight carloads daily.

Silica Sand

Oliver Silica Sand Co., Massillon, Ohio, held its annual meeting on January 22 and named the following directors: E. B. Fritchman of Sebring, R. H. Rhodes of Alliance, Sumner Oesch of Sebring, J. Lew Thomas of Alliance, and J. L. Reeves of Massillon. The directors then organized as follows: Mr. Fritchman, president; Mr. Rhodes, vice-president, and Mr. Reeves, secretary-treasurer and general manager.

Obituaries

Samuel Wylie Miller, consulting engineer of the Union Carbide and Carbon Research Laboratories, Inc., of Long Island City, N. Y., well known both in the United States and Europe as a pioneer in oxy-acetylene welding and an authority on its application, died on February 3 at his home in Hollis, Long Island, N. Y., at the age of 62. Mr. Miller was a native of New York and received his degree in Mechanical Engineering from Stevens Institute in 1887. His first professional activities were as master mechanic for the Pennsylvania railroad plants at Logansport, Indianapolis, Ind., and Columbus, Ohio. Following this he was with the American Locomotive Co. at Dunkirk, N. Y., and Providence, R. I., after which he founded the Rochester Welding Works at Rochester, N. Y. During the World War he served on the welding committee of the Emergency Fleet Corp. In 1921 he joined the newly formed Union Carbide and Carbon Research Laboratories, Inc. In professional circles Mr. Miller was recognized as an able engineer. He was a director and past president of the American Welding Society, a director of the American Bureau of Welding, and chairman of the oxy-acetylene committee of the International Acetylene Association. As a member of the welding subcommittee of the boiler code committee he was prominently identified with the American Society of Mechanical Engineers. He was an active member of the American Institute of Mining and Metallurgical Engineers, American Society for Steel Treating, British Iron and Steel Institute, Institute of Metals, and other scientific and engineering organizations.

S. W. Miller